A STUDY OF ELECTRICITY PLANNING IN THAILAND: AN INTEGRATED TOP-DOWN AND BOTTOM-UP COMPUTABLE GENERAL EQUILIBRIUM (CGE) MODELING ANALYSIS

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by

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A STUDY OF ELECTRICITY PLANNING IN THAILAND: AN INTEGRATED TOP-DOWN AND BOTTOM-UP COMPUTABLE GENERAL EQUILIBRIUM (CGE) MODELING ANALYSIS

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Cornell University 2014

This dissertation examines the potential impacts of three electricity policies on the economy of Thailand in terms of macroeconomic performance, income distribution, and unemployment rate. The three considered policies feature responses to potential disruption of imported natural gas used in electricity generation, alternative combinations (portfolios) of fuel feedstock for electricity generation, and increases in investment and local electricity consumption. The evaluation employs Computable General Equilibrium (CGE) approach with the extension of electricity generation and transmission module to simulate the counterfactual scenario for each policy. The dissertation consists of five chapters.

Chapter one begins with a discussion of Thailand's economic condition and is followed by a discussion of the current state of electricity generation and consumption and current issues in power generation. The security of imported natural gas in power generation is then briefly discussed. The persistence of imported natural gas disruption has always caused trouble to the country, however, the economic consequences of this disruption have not yet been evaluated. The current portfolio of power generation and the concerns it raises are then presented. The current portfolio of power generation is heavily reliant upon natural gas and so needs to be diversified. Lastly, the anticipated increase in investment and electricity consumption as a consequence of regional integration is discussed.

Chapter two introduces the CGE model, its background and limitations. Chapter three reviews relevant literature of the CGE method and its application in electricity policies. In addition, the submodule characterizing the network of electricity generation and distribution and the method of its integration with the CGE model are explained.

Chapter four presents the findings of the policy simulations. The first simulation illustrates the consequences of responses to disruptions in natural gas imports. The results indicate that the induced response to a complete reduction in natural gas imports would cause RGDP to drop by almost 0.1%. The second set of simulations examines alternative portfolios of power generation. Simulation results indicate that promoting hydro power would be the most economical solution; although the associated mix of power generation would have some adverse effects on RGDP. Consequently, the second best alternative, in which domestic natural gas dominates the portfolio, is recommended. The last simulation suggests that two power plants, South Bangkok and Siam Energy, should be upgraded to cope with an expected 30% spike in power consumption due to an anticipated increase in regional trade and domestic investment. Chapter five concludes the dissertation and suggests possibilities for future research.

BIOGRAPHICAL SKETCH

Supree Srisamran received his Bachelor degree in Mechanical Engineering from Thammasat University, Bangkok, Thailand in 2001. After he graduated, he was awarded a training scholarship by Swiss-Thai Chamber of Commerce to intern with Sika AG, an adhesive and construction chemical company, in Zurich, Switzerland. After completion of the training program, he returned to Bangkok and worked with SIKA (Thailand) LIMITED for two years. He then continued his Master degree in Engineering Management at Tufts University, Medford, Massachusetts and completed his Master degree in 2007. Subsequently, he joined Blackmore Partners Inc. in Chicago as a business analyst intern for one year prior to pursuit of his Doctoral education in Regional Science in the Department of City and Regional Planning at Cornell University, Ithaca, New York.

At Cornell, Supree gained his experience in studying, teaching, and researching aspects. He was a teaching assistant in Introduction for Quantitative Methods for Policy Analysis course as well as an Introduction to Real Estate course. His research interests were energy economics, macroeconomics, and financial management and policies. In addition, with his diverse background in engineering and business, he is also interested in automotive technology, manufacturing process control and improvement, investment and business management.

To my beloved family

ACKNOWLEDGMENTS

I was born in Udon Thani province which is considered to be far away from Bangkok, the metropolitan center of Thailand. When I was young, studying abroad was quite a farfetched idea, especially pursuing the Doctoral degree in a prestigious University like Cornell. Without the support and encouragement from professors, family, and friends, I would not have had a chance to fulfill my dream. Thus, I would like to take this opportunity to express my deepest gratitude to all of them.

I am truly grateful to my dissertation committee: Professor Kieran P. Donaghy, Professor Mark A. Turnquist, and Professor Timothy D. Mount. I learned a good deal from them and truly appreciated their help and contributions. Working with Professor Kieran was an invaluable experience because he was always willing to share his opinions, experience, and knowledge. His guidance contributed throughout the entire process of writing of this dissertation. Aside from the dissertation, I would also like to thank him for giving me a chance to be a teaching assistant and his support for the academic conference participations. I am so greatly indebted to Professor Turnquist as well for his help and supervision to develop the model. His comprehensive advice was always beneficial and reflected the engineering side (Bottom-up) of the model in my dissertation. I am profoundly grateful to Professor Mount who always gave me insightful information about the electricity industry and helped guide my analysis. His constructive comments always enlightened many aspects of the analyses in this dissertation.

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CHAPTER 1

THE STATE OF THAILAND ECONOMY AND ITS ELECTRICITY GENERATION SECTOR

1.1 Introduction

Electricity is one of the most important public utilities. It facilitates both social and industrial development of the modern world. Economic expansion usually requires not only supplementary raw materials but also greater energy supplies for its activities. Electric power is the simplest form of energy and is widely utilized by all business sectors. According to the Department of Alternative Energy Development and Efficiency (DEDE), during the past two decades (1992-2011), Thailand's average Electric Consumption Elasticity was 1.01%. This implies that Thailand's electricity consumption grew by 1.01% for every one percent in increased in Gross Domestic Product (GDP) (Energy Policy and Planning Office, 2012). Thailand has always required continuous increments in electrical power generation to nourish its growing economy.

The subject of electricity supply and security has ultimately become a top priority of the Thai government. As recently announced in the current Yingluck Administrative Policy Statement, the government plans to reinforce energy security through development of the country's electrical grid and through utilization of new and existing energy resources. This reinforcement will be done both in Thailand and abroad as well as by developing new energy resources and diversifying the types of energy used (Policy Statement of the Council of Ministers, August 23, 2011). It is

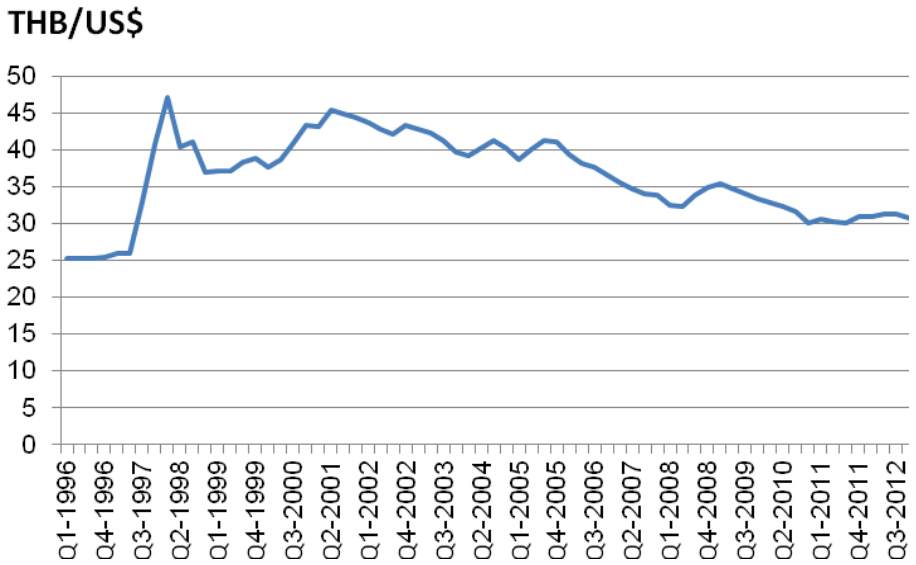
important to explore carefully and truly understand how the effects of changes in electricity generation and transmission patterns affect the Thai economy.

This chapter presents the state of the Thai economy and the background of Electricity Supply Industry (ESI) in Thailand. The second section discusses Thailand's economic conditions and the status of national energy utilization. The third section illustrates the structure of ESI, which includes government bodies and private entities. The fourth includes the details of the current state of electricity generation and gives information about regional demands for electricity. The fifth section illustrates interested case studies. The policies and current issues concerning expansion of electricity generation capacity are provided. The sixth section presents the objective of this study. Lastly, the seventh section gives the scope of this study.

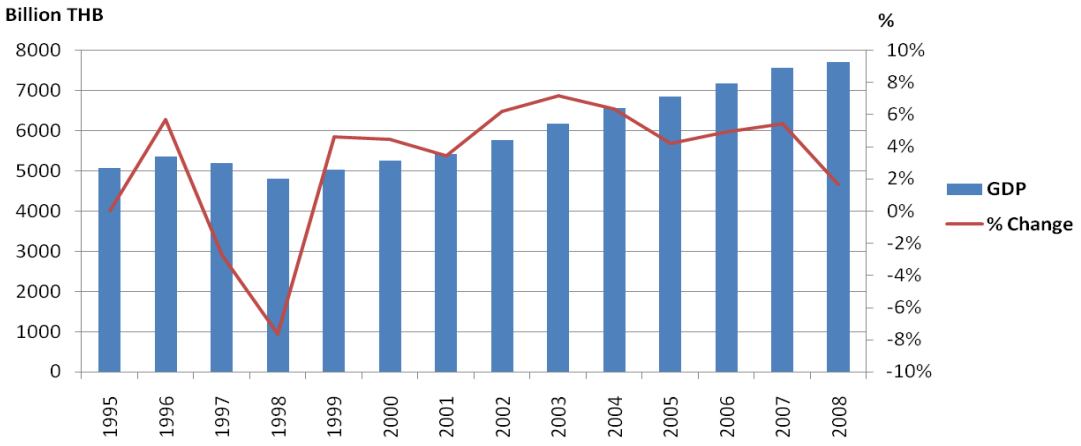
1.2 Thailand's Economic Conditions and the Status of Energy Utilization

Thailand's economy experienced high volatility during the past few decades owing to internal and external factors. In 1997, a formidable financial crisis erupted because of the fundamental weakness in real appreciation of the Baht, and deterioration in current account positions, excessive external borrowing by banks and currency mismatch, excessive growth of domestic credit, and the bursting of an asset price bubble also occurred (Zhuang et al., 2002). The end of the pegged value of Thai Baht on July 2, 1997 coupled with currency speculating led to devaluation of the Baht. As seen in Figure 1.1 the average exchange rate at general commercial banks in Bangkok increased from 31.37 Baht/USD to 41.37 Baht/USD in 1998 (Bank of Thailand, 2012). Thailand's economy suffered greatly through loss of its

competiveness in export markets and resulting decrease in business activities. Many financial institutions were shut down. As seen in Figure 1.2 Gross Domestic Product (GDP) growth (at 1988 price) decreased by 1.4% in 1997 followed by a 10.5% plunge in 1998. In particular, private investment fell by almost 15% on average (Bank of Thailand, 2012).

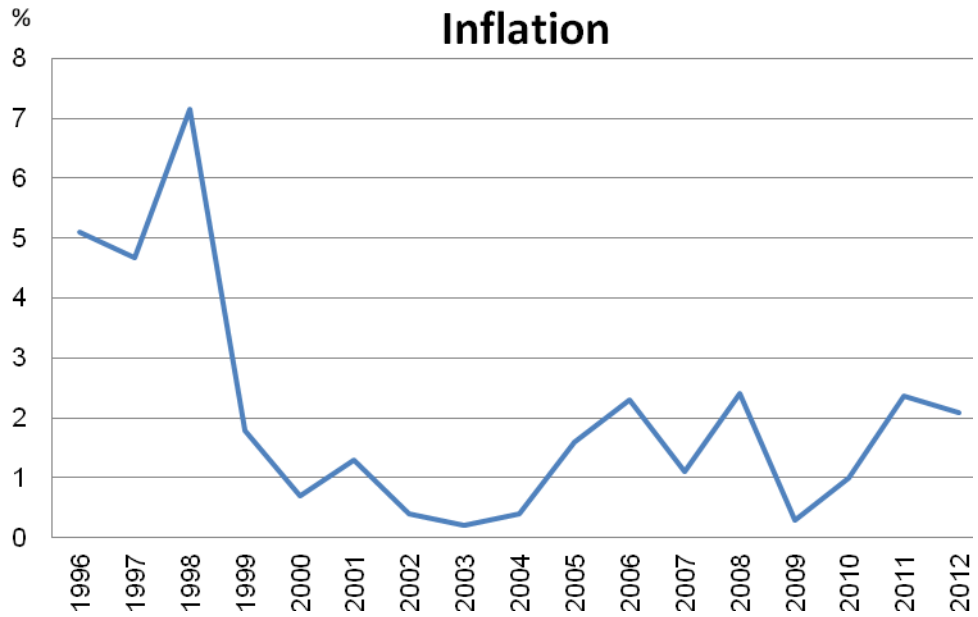


Source: Bank of Thailand
Figure 1.1: Exchange Rate (THB/US$)



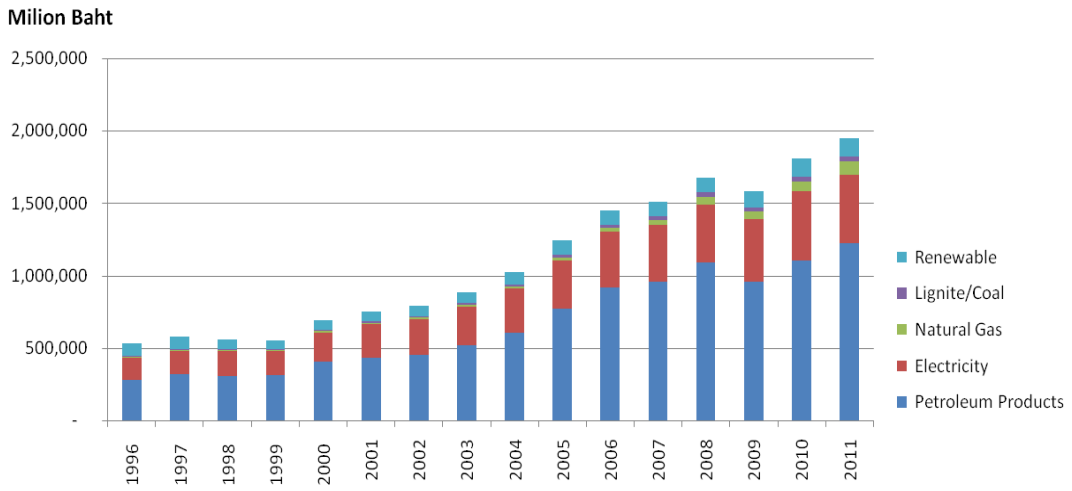
Source: Bank of Thailand
Figure 1.2: Gross Domestic Product Growth in 1988 Prices

Inflation jumped from 4.76% in 1997 to 7.16% in 1998 (Bank of Thailand, 2012). Even during the resulting period of high inflation, expenditures on final energy products from 1996 to 1999 remained quite stable as shown in Figure 1.4. In terms of the quantity of energy products consumed, petroleum, natural gas, coal, lignite, imported and hydro generated electricity, rose by 4.9% from 1,120,759 barrels/day in 1996 to 1,175,656 barrels/day in 1997 as illustrated in Figure 1.5. Although the consumption of energy commodities fell in the following year (1998), the level remained close to the pre-crisis period at 1,086,464 barrels/day (Energy Policy and Planning Office, 2012). This phenomenon shows the essential nature of energy commodities to the country.



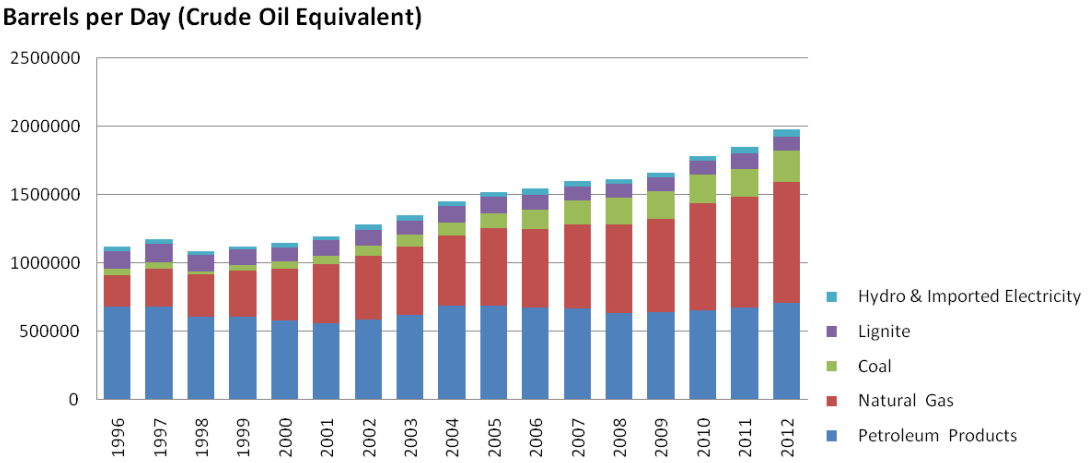
Source: Bank of Thailand

Figure 1.3: Inflation



Source: Energy Policy and Planning Office

Figure 1.4: Expenditure on Final Energy Consumption (Million THB)



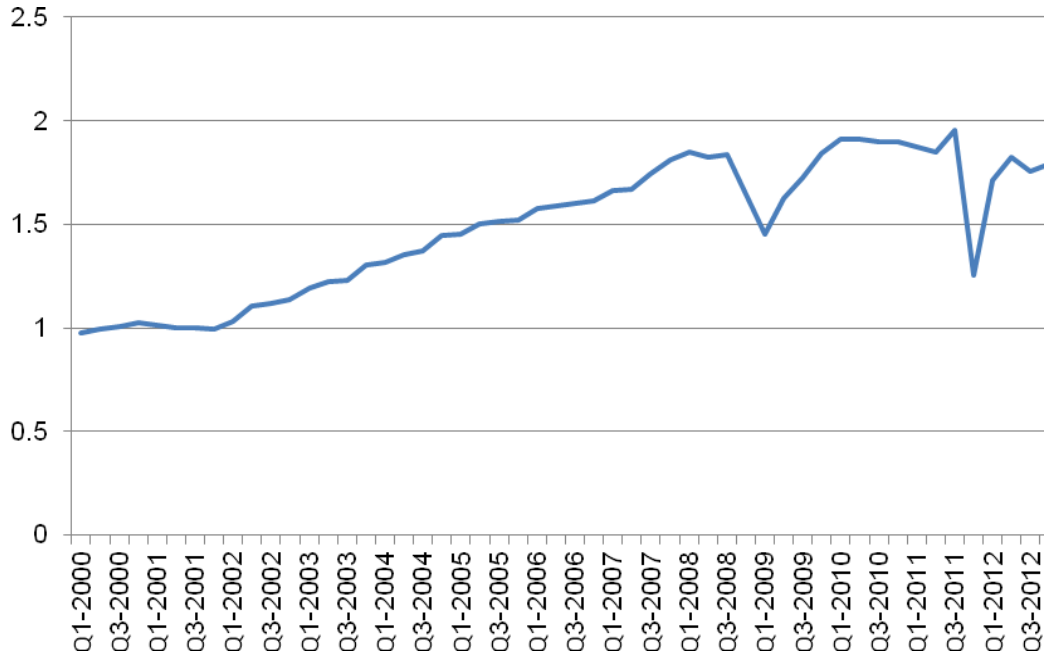
Source: Energy Policy and Planning Office

Figure 1.5 Consumption of Commercial Primary Energy (Barrels per day)

The 1997 crisis did not last very long. In 1999, with tightened monetary policy and assistance from the International Monetary Fund (IMF), Thailand's economy progressively improved. The exchange rate recovered to 37.84 Baht/USD. Inflation decreased from 7.16% in 1998 to 1.78% in 1999.

The Thai economy after 1999 was fairly stable. The GDP grew steadily at rates between 0% and 2% with low inflation. With careful intervention and constant monitoring by the Central Bank of Thailand, the exchange rate improved and a resurgence of private investment was seen. These developments indirectly led to an increase in private consumption. The energy sector also gained during the economic recovery since energy spending was significantly greater in 1999 to 2000.

In 2001, Thaksin Shinawatra, a billionaire telecommunication tycoon, was elected Prime Minister. His political party, Thai Rak Thai, brought political stability to the country since it gained 248 of total 500 seats in House of Representatives. Thai Rak Thai easily formed a government since it required only 3 more seats from a coalition party. During Thaksin's era, Thailand's economy flourished as a consequence of an upturn in the global economy and public policies of economic stimulus. The stock market also responded to the favorable investment climate by climbing from an historical low of 306.25 points in 2001 to 366.88 points in 2002 after being bearish since 1997. Its growth continued reaching 654.77 points in 2004 (The Stock Exchange of Thailand, 2012). The Manufacturing Production Index (MPI) shows a monotonically increasing trend since 2000, as presented in Figure 1.6.



Source: Bank of Thailand

Figure 1.6: Manufacturing Production Index

Regarding energy policy, the Thaksin administration made a bold decision to privatize the Petroleum Authority of Thailand (PTT). PTT was a giant state owned energy entity. Privatization was a huge reform in the energy sector. On October 1, 2001, PTT was finally listed on the Thai stock market. The Ministry of Finance held 51% of total shares (Petroleum Authority of Thailand, 2012). Privatization thus gave PTT a great opportunity to seek additional capital and to improve its corporate management. Ultimately, PTT became the largest vendor of domestic oil and is now the sole natural gas distributor.

In 2006, the political climate changed. Political protestors rose up against the Thaksin administration with accusations of mismanagement and corruption. The situation worsened when Thaksin decided to sell his own telecommunication

company, Shin Corporation. The company was sold to Temasak, a Singaporean holding company. Thaksin neglected to pay capital gains taxes. The conflict reached its peak in September. The military resolved the dispute by committing a coup d'état. Thaksin and some former ministers were quickly exiled from the country. However, the coup did not impact the overall economy much, and GDP growth slowed only slightly. The MPI still showed an upward trend after the coup since it took place only in central Bangkok, the metropolitan area, while most of the manufacturing hubs are located outside of Bangkok's perimeter. A temporary government was subsequently installed and held office for a year before a new general election.

In 2008, Thailand encountered another global financial meltdown as a result of the bursting of the Unites States housing bubble. Contributing factors were some financial products, i.e., Mortgage-Backed Securities (MBS) and Collateralized Debt Obligations (CDO). The effect of this catastrophe spread throughout the world. It brought the collapse of many large international financial institutions such as Bear Stern, Lehman Brothers, and Merrill Lynch. Even though it was equipped with more cautious investments and prudent financial regulations from lessons learned from the 1997 crisis, the global consequences still overwhelmed the Thailand. The net export and private consumption fell in the fourth quarter of 2008 as well as the MPI (Bank of Thailand). Energy consumption in 2008 did not follow any of the other economic indicators. Prices of energy products were the highest in the past decade.

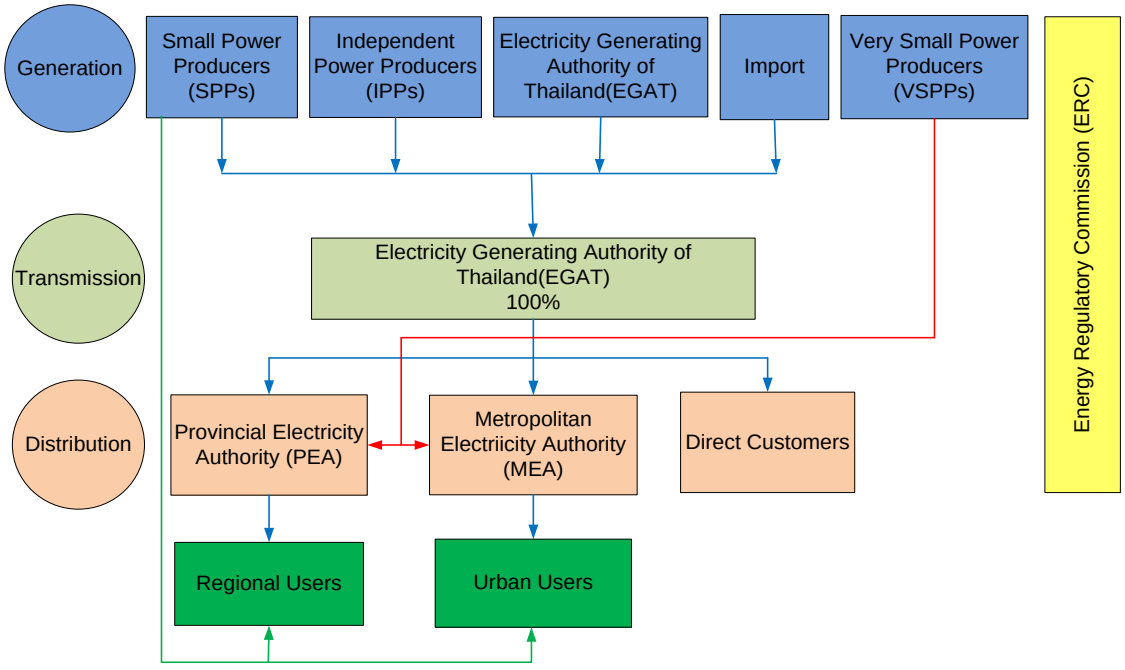
Since 2008, economic conditions were healthy with the positive GDP growth and increasing MPI. In 2011, Thailand faced unprecedented flooding in almost every region of the country. Flooding in the north and central regions destroyed crops in the

main agricultural parts of the country as well as industrial real estate and residential areas. The flood damage lasted for a few quarters and economic conditions improved afterwards. Despite the loss and recession in business activity, energy consumption in 2008 did not fall at all. The consumption of primary energy commodities rose by 4%.This may due to the reconstruction after flooding. In summary, historical data reveal that overall energy consumption in Thailand always cohesively moved with GDP growth and manufacturing activity.

1.3 The Structure of Electricity Supply Industry in Thailand

This part presents the structure of the Electricity Supply Industry (ESI) and its major stakeholders in Thailand. Like many developing countries, the Thai ESI is engaged in three main activities: generation, transmission, and distribution. These activities are regulated by the Energy Regulatory Commission (ERC) under the Ministry of Energy.

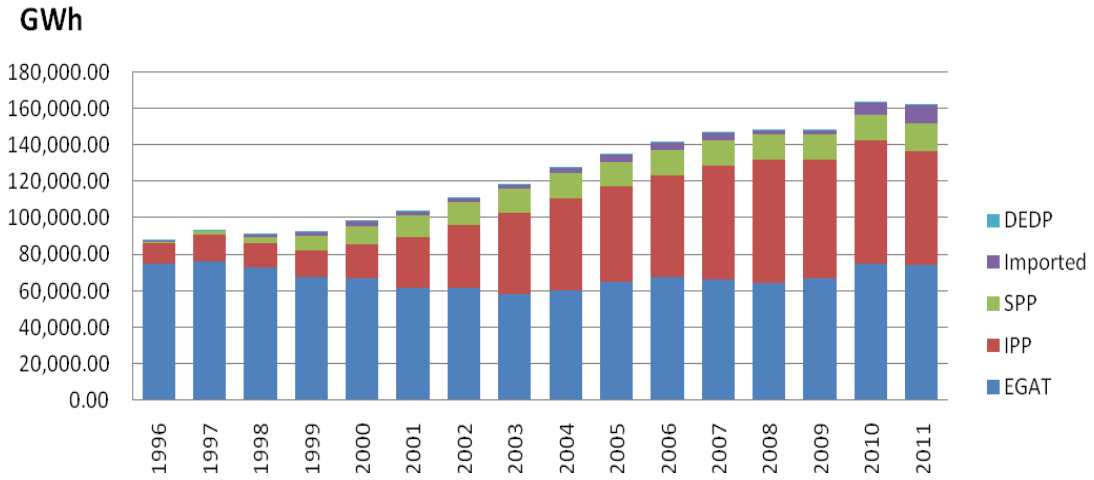
For the generating mission, as shown in Figure 1.7, there are five sources of electricity in Thailand. They are the Electricity Generation Authority of Thailand (EGAT), Independent Power Producers (IPPs), Small Power Producers (SPPs), electricity imported from neighboring countries, and Very Small Power Producers (VSPPs).



Source: Ministry of Energy

Figure 1.7: The structure of Thailand Electricity Industry

Of all the producers, EGAT is the leader in the electricity industry since EGAT is a major power producer, an electricity single buyer, and the sole distributer. It presently is a state-owned enterprise under the Ministry of Energy. EGAT was established on May 1, 1969 by the promulgation of the Electricity Generating Authority of Thailand (Act. B.E. 2511). The Act merged the assets and operations of three previous state enterprises: Yanhee Electricity Authority, Lignite Authority and the Northeast Electricity Authority (Electricity Generation Authority of Thailand, 2012). The missions of EGAT ranged from generating electricity and providing power resources to distribution networks. In 2011, EGAT provided 46% of total electricity production as shown in Figure 1.8 (Energy Policy and Planning Office, 2012).



Source: Energy Policy and Planning Office (EPPO)

Figure 1.8: Electricity Generation by Producers (GWh)

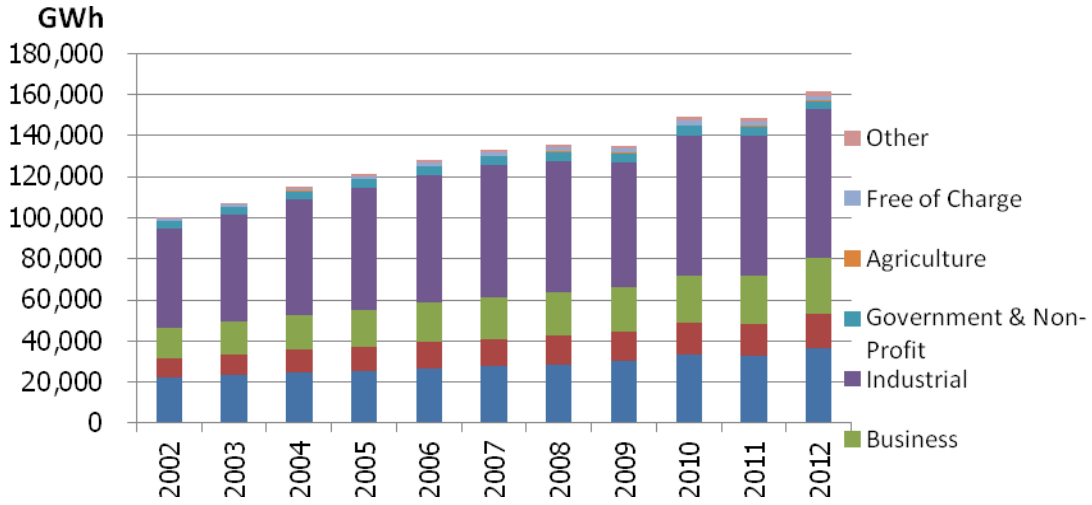
The other three electricity generation groups, IPPs, SPPs, and VSPPS, are private power producers who generate and sell almost of their electrical output to EGAT. They are clearly defined by their generation capacity. IPP plants have capacities of more than 100 MW. SPP plants and VSPP plants produce between 10MW to 90 MW and less than 10 MW respectively (Energy Policy and Planning Office, 2009). As shown in Figure1.8, in 2011, IPPs and SPPs supplied 39% and 9%, respectively, of the electrical power consumed domestically. It is important to note that EGAT also owns stock of the two largest national IPPs. EGAT holds 45% of Ratchaburi Electricity Generation Public Company Limited (RATCH) and 25.41% of Electricity Generation Public Company Limited (EGGO) (EGAT, 2009). Therefore, EGAT has a power monopoly and is able to control are electricity generation and transmission based on the capacity of its own power plants and as a major stock holder of two the largest IPPs.

Lastly, Thailand has met its need for electrical power by importing electricity from two neighboring countries: Laos and Malaysia. Imports have accounted for 7% of total consumption. EGAT currently purchases about 2000 MW from Laos to supply it Northeastern region. Most of this is hydroelectricity (Electricity Generation Authority of Thailand, 2012).The country buys an additional 300 MW from Malaysia to supply its Southern region (U.S. Energy Information Administration, 2013).

Once power is generated by various types of producers, EGAT purchases almost all of it and resells the power to distribution bodies. These are the Metropolitan Electricity Authority (MEA) and Provincial Electricity Authority (PEA). The MEA allocates power in its area of responsibility: metropolitan Bangkok, and the two adjacent provinces of Nonthaburi and Samutprakarn. PEA supplies power to the rest of 73 provinces under the control of its twelve regional offices.

1.4 The Current State of Electricity Consumption and Generation

In 2011, Thai electricity consumption was 104,928 GWh with installed capacity of 31,447 MW. Over the past decade (2002 -2011), the Industrial sector had the highest share of electricity consumption at 47.1%, followed by the Residential and Business sectors at 21.7% and 15.4%, respectively (Energy Policy and Planning Office, 2012). Geographically, metropolitan Bangkok accounted for 49.1% of total electrical power consumed for the past ten years. This is because Bangkok is the largest municipality, the business hub of the country, and the seat of the government.

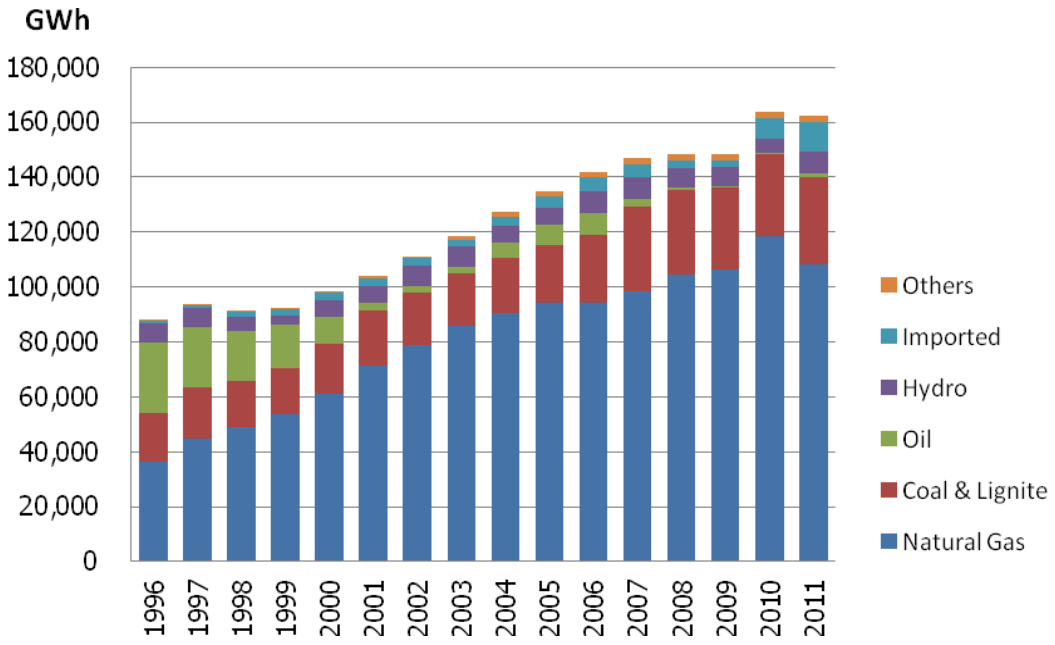


Source: Energy Policy and Planning Office (EPPO)

Figure 1.9: National Electricity Consumption Classified by Sector (GWh)

The peak load consistently occurs during May. This is one of the hottest months of the year. The peak load in 2011 was 24,518 MW occurring on May 24. This was 0.5% lower than in the previous year. Average annual electricity consumption grew by 4.5% per year for the past decade (Energy Policy and Planning Office, 2012). With steady growth in consumption and a requirement to maintain a reserve margin of not less than 15% of system capacity, the government had to actively seek additional power resources.

Traditionally, more than 90% of electricity is generated from fossil fuels, especially natural gas. Roughly 3% is hydroelectricity. The remainder of the electricity is imported from neighboring countries, Laos and Malaysia (Electricity Generation Authority of Thailand, 2012).In 2011, to produce electricity, the country relied on natural gas by (66%),followed by Coal and Lignite (19%) and hydroelectricity (5%). These generation shares are shown in Figure 1.10.



Source: Energy Policy and Planning Office (EPPO)

Figure 1.10: Electricity Generation by Fuel Type (GWh)

Approximately 65% of natural gas used is produced domestically while the rest is imported from Myanmar. Almost 80% of natural gas is used for generating electrical power (Energy Planning and Policy Office, 2012). The entire natural gas supply is procured by PTT through production and transportation, i.e., the gas pipelines connecting offshore Burmese wells and onshore Thai power plants. These are under the control of PTT.

In 2011, the country used 35.29 million metric tons of Lignite and coal. Of this total, 83% was used as fuel for electricity generation. The remainder was used for other industrial purposed such as clinker production and industrial boilers (Energy Planning and Policy Office, 2012). On the supply side, the country is able to produce

21.32 million metric tons of Lignite and 16.33 million metric tons of coal are imported from Australia and Indonesia. Domestic Lignite production is done in Lampang province in the north of the country. The largest (2,625 MW) coal fired power plant is located in Mae-Moh. This facility and Lignite mines belonging to EGAT are well integrated and have become the backbone of power generation in the north. Hydroelectricity is a primary resource for electrical power generation in Thailand. This is due to the number of rivers and the country's geography. Hydro power stations are scattered in almost every region of the country at dams and reservoirs. Hence, the sizes of hydroelectric power stations varied because of stored mass of water. For example, Bhumibol dam, a concrete arch dam on the Ping River, has 749 MW of installed capacity, while the Nam Phong dam on the Nam Phong River, possesses only 6.3 MW of capacity. However, production of hydroelectric power is naturally restricted because water is reserved for agriculture in the drought season.

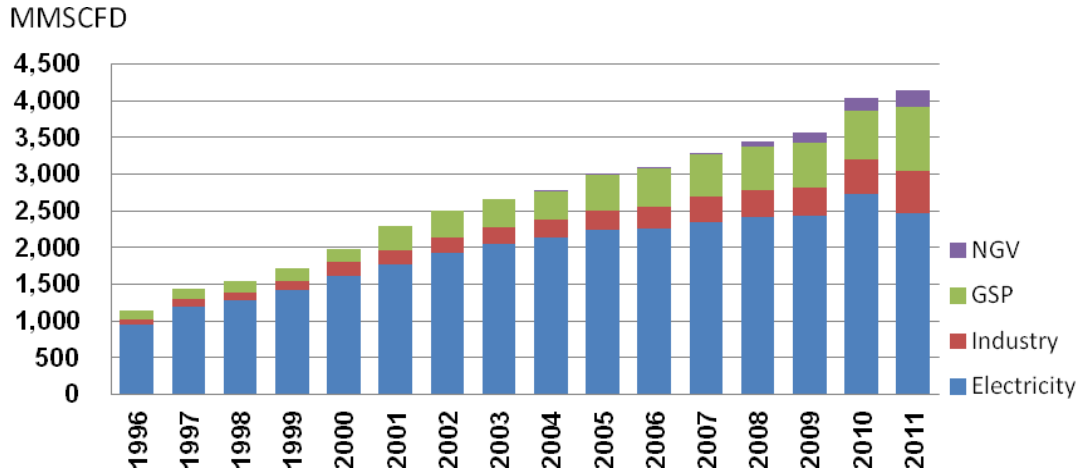
The nature of electricity supply typically causes concern. Many government agencies, international organizations, and NGOs are of the opinion that energy security is threatened by increasing prices and scarcity of energy commodities. The World Bank, in particular, issued warning massages in four areas. These are: 1) high energy intensity and increasing consumption, 2) paucity of domestic energy resources and concern about energy security, 3) slow implementation of energy conservation and Demand Side Management (DSM), and 4) slow implementation of renewable energy programs (The World Bank, 2013).

The next section will address specific policies and planning issues that will be explored in simulations of different counterfactual scenarios in Chapter 4 of this research.

1.5.1 Case Study I: The Security of the Natural Gas Supply to Electricity Generation

Figure 1.11 indicates that the highest proportion of natural gas consumption is used for electricity generation. Regarding power production, natural gas fired power plants account for approximately 70% of total installed capacity. The heavy dependence on gas and lack of use of other fuels brings serious concern about energy security in power production.

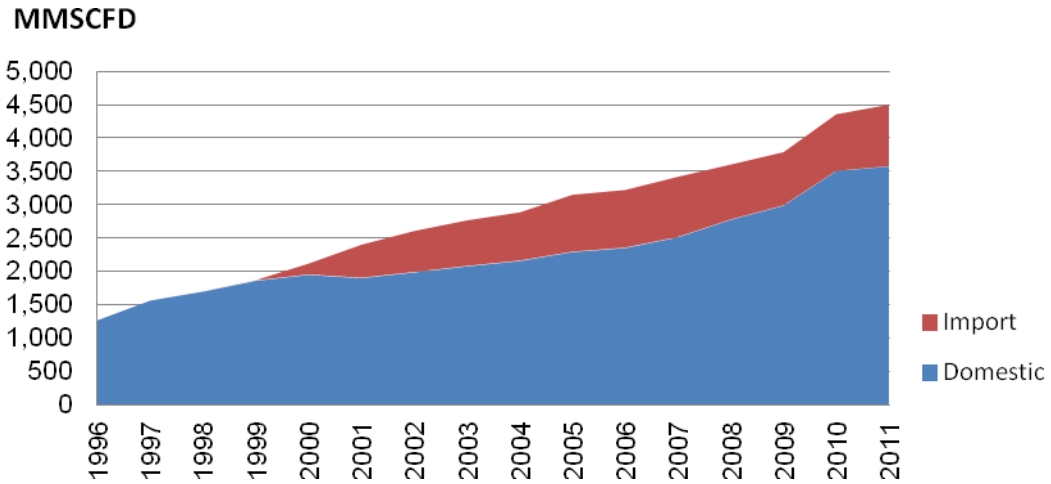
According to the May 31, 2011 remarks of Mr.Kurujit Nakornthap, the Deputy Permanent Secretary of Ministry of Energy, proven and probable natural gas reserves are 23 trillion cubic feet. If the production is maintained at the current level of 3,747 million cubic feet per day without discovery of new reserves, the current supply will be exhausted in 18 years. Additionally, the Asia Pacific Energy Research Centre (APERC) predicts that natural gas consumption in Thailand will be the most rapidly consumed primary energy resource. Its use is expected to grow at an annual average rate of 4.4% from 2010 to 2035 (Thongrung, 2013).



Source: Energy Policy and Planning Office

Figure 1.11: Natural Gas Consumption by Sector (MMSCFD)

Domestic gas production occurs primarily in the Gulf of Thailand. The Petroleum Authority of Thailand Exploration and Production (PTTEP), a subsidiary of PTT, is the premier gas provider and continues to explore for new gas resources domestically and globally. The Petroleum Authority of Thailand Natural Gas Distribution (PTTNGD) is responsible for transmission and distribution pipeline systems to move imported natural gas from the Myanmar Yedana and Yedagun offshore fields in the Andaman Sea to onshore facilities in Thailand. In 2011, Thailand purchased an average of 830 million standard cubic feet per day (MMSCFD) of natural gas from Myanmar to meet approximately 18% of the Thai excess demand as shown in Figure 1.12.



Source: Energy Policy and Planning Office

Figure 1.12: Production and Import of Natural Gas (MMSCFD)

At the beginning of 2013, Thailand received notification from Myanmar of expected disruptions in their natural gas supply beginning on April 4, 2013. This was due to maintenance activities in Yadanagas field facilities. This disruption is expected to reduce the daily supply of 1000 MMSCFD billion cubic feet of gas. This affected the operations of six power plants in Western Thailand with combined capacity of 6,000 MW, as reported by United Press International on February 9, 2013. Fortunately, the country's three electricity authorities, EGAT, MEA, and PEA have sufficient time to plan to handle projected power shortages. This will likely be done through use of more petroleum products for fuel and encouraging conservation among industrial and household users.

As with other fossil fuels, natural gas prices are unstable due to fluctuating global demand and supply. However, for Thailand, this is less of an issue since the majority of its supply is produced domestically. Furthermore, natural gas prices have

been declining since 2008. The National Energy Policy regulates the domestic natural retail price in Thailand. It is kept below that of the international market. Retail consumers are charged a pooled price based on a weighted average producer gas price Index of fuel oil price and economic indicators (U.S. Energy Information Administration, 2013).

1.5.2 Case Study II: Portfolio of Electricity Generation and Power Network

As shown in Section IV, Thailand is a natural gas-fuel-intensive country. Compared to Japan, which is well known for its diversification of fuels and balance in its portfolio of electricity generation, Thailand is far more dependent upon natural gas. Japan has 282 gigawatts (GW) of total installed electricity generating capacity. This made it the third largest in the world behind the United States and China in 2010. Its power generation is derived 32% from nuclear, 27% from natural gas, 25% from coal, and 6% from hydroelectricity and other renewable energy resources (U.S. Energy Information Administration, 2012).

In addition to generation, electrical transmission networks are another key concern regarding efficiency and power accessibility in ESI. EGAT is primarily responsible for transmission expansion and network improvement. The power network currently relies on four main sizes of transmission cable: 500 kV, 230kv, 115 kV, and 69 kV (kilo Volt). The existing 500 kV cable, which can have the highest load, are used only to carry electricity along two main routes. The first is from Mae Moh, a coal-fired power plant in the north to the central part of the country. Meanwhile, across other regions are connected by 230 kV and 115kV power lines.

Without adequate transmission network capacity and well developed emergency plans, Thailand is likely to face temporary power shortages, even blackouts. The probability of this is high. On May 21, 2013, a power failure occurred in 14 Southern provinces due to failure of the main 230kV transmission line connecting the south and central regions. The blackout affected more than eight million people and required more than three hours for repairs (Chaichalearmmongkol, 2013)

An academic investigation further shows that Thai energy insecurity is rooted in three major sources: rising energy demand, limited fossil energy reserved, and political market risk of energy imports and the energy price in the world market. (Martchamadol and Kumarn, 2012). Among the three main sources, rising energy demand is seen to be least avoidable, since the relationship between electricity consumption and economic growth of Thailand show significant correlation (Yoo, 2005). On the other hand, the world price and supply of energy product is the least controllable factor.

Many policy makers and researchers thereby shift their attention to seeking new domestic resources for electricity generation in order to mitigate the risk of fuel shortage. The mission to diversify fuels used in electricity generation has been addressed as part of the national agenda. This was done in addition to developing other policies including adopting new technologies, improving energy efficiency and Demand Side Management (DSM).

Numerous academic studies have been carried out to evaluate the adjustment of input composition for power generation matching up with the future economic

expansion. The significant findings are twofold. First, embracing greater renewable energy in a mixed fuel portfolio is unlikely to favor imported energy goods (see Nakaviro et al., 2007a, 2007b; Chaivongvilan and Sharma, 2008). The fulfillment of renewable energy is believed to be superior to present fossil-dominated mixes since it will create an efficient portfolio which can reduce generation cost and enhance energy security (Awerbush, 2004). Second, others studies suggest that natural gas will remain a prime feedstock in the long run and be imported in the form of Liquefied Natural Gas (LNG) or produced domestically (for example, see Mulugetta, 2007; Wangjiraniran and Euaarporn, 2010; Vithayasrichareon and Macgill, 2012).

All in all, the conclusions of these existing studies foreshadow the future of electricity generation planning and underscore many important features of the Thai energy sector. However, these studies have had limited scope of inquiry and have not provided comprehensive linkages between different portfolios of power generation and power distribution network constraints.

1.5.3 Case Study III: The Case of Rising in Investment and Local Electricity Consumption

Electricity consumption is an index that can be used to measure the growth of a country's economy. In Thailand, electricity consumption has increased almost every year owing to growth in its manufacturing and service sectors. In addition to the country's own electricity requirement, the projected power consumption is expected to increase dramatically as a result of pending regional cooperation. The Association of Southeast Asian Nations Economic Community (AEC) cooperation framework was

established to stimulate regional corporation and accelerate regional economic growth. AEC can be characterized by the following key features: (1) a single market and production base, (2) a highly competitive economic region, (3) a region of equitable economic development, and (4) a region fully integrated into the global economy (ASEAN, 2013). When AEC comes into being on December 31, 2015, it is expected to combine populations of over 575 million and total trade of over US$ 1,400 billion (TCEB, 2013).

Given the country's strategic location as a connectivity base, Thailand would become the center of manufacturing and logistics when AEC comes into being. As mentioned earlier, economic expansion has always induced higher levels of trade, investment, and power consumption. For Thailand, the Central and Eastern regions would seem to gain the most benefit from this AEC framework because these two regions contain many business and manufacturing hubs. Considering power reserved, there are many power plants located in the Eastern side of the country while much less in the Central. The effect of increased power requirement in these two potentially booming regions has not yet been examined and neither have the economic and socioeconomic impacts on the country of embracing the AEC framework.

1.6 Objective of the Study

The objective of this dissertation is to illustrate and assess different energy policies by employing a Computable General Equilibrium (CGE) framework that has been integrated with a module of electricity generation and transmission. Three counterfactual scenarios are simulated and their effects assessed with reference to macroeconomic performance, the distribution of income, as well as the configuration of electricity generation and distribution. The three scenarios considered are:

1.6.1 The Disruption of Imported Natural Gas

This scenario will illustrate the effect of disruption of the flow of imported gas to the economy. The various levels of gas shortage will be simulated and then the behavior of other energy sectors will be observed in response to the sudden disruption. Natural gas disruption is still highly possible. Occurrences such as these will certainly reduce electrical power generation leading to diminished business activity.

1.6.2 The Different Input Compositions for Electricity Generation

The second simulation will reveal the macroeconomic consequences of different portfolios of electricity generation as well as the reaction of power production and transmission activity. An integrated module will give the pictures of the generation patterns of different portfolios at specific time periods. Different input composition for power generation has been widely discussed for many decades. The

steady growth of power consumption is the prime factor challenging the policy makers.

1.6.3 The Case of Increasing Investment and Local Electricity Consumption

Adopting the AEC framework will definitely have certain effects on national investment and the electricity sector. This last simulation will explore the effect of increasing investment and power consumption in three locations on true electricity generation, economic and socio-economic aspects. Currently the government has concentrated mostly on the business strategy to attract more investors and skilled laborers. Yet the effect of joining the AEC on power utility as basic infrastructure has not been examined.

1.7 The Scope of the Study

This research focuses on the evaluation of policies involving provision of electricity in Thailand. The counterfactual scenarios were based on data from the Social Accounting Matrix (SAM) for the year 2006. Based on availability, the alternative substitute fuels considered were hydro power, and imported electricity.

Regarding generation and transmission, only the existing electricity generating infrastructure was considered. The generation capacity and power network were based upon information found in the EGAT Power Development Plan (PDP) report of 2006. Data on the consumption of electricity were collected at 13 reference points. Lastly, the additional module was combined with the CGE model using the two-way feedback method of integraton.

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CHAPTER 2

THE COMPUTABLE GENERAL EQUILIBRIUM (CGE) FRAMEWORK

2.1 Introduction

This chapter lays the foundation of the research methodology using Computable General Equilibrium (CGE) models. CGE models are widely used in public policy analysis nowadays. The background of these models is given in section two. The limitations of the models are provided in section three. The model components are shown in the chapter's last section.

2.2 The Background of the Computable General Equilibrium (CGE) Model

CGE is classified as the economy-wide class of models that provides industry disaggregation in a quantitative description of the whole economy (Dixon and Rimmer, 2010). The original economy-wide model was Leontief's input-output model (Landefeld and Petrl, 1999). Based on an input-output table data, the input-output model performed fairly well in capturing the flows of goods and services between all the individual production sectors of the national economy. However, without any economic institutions such as households, firms, and governments, the capabilities of Leontief's input-output table are limited. As a consequence, the Social Accounting Matrix (SAM) table was developed to track monetary and goods flows between industries and institutions. A SAM has an input-output table as its subset and additional economic institutions, i.e. agents. Although the SAM-based

model is not difficult to construct, it does not integrate some real world features such as endogenous price determination and nonlinear behavior (Manopiniwes, 2005).

CGE models were created to address these deficiencies. The first CGE model was developed by Leif Johansen (1960), a Norwegian economist, in his dissertation. Johansen's original model featured 20 industrial sectors and one aggregated household sector while public consumption, net investments and exports were exogenously determined (Bergman and Henrekson, 2003). After the ground breaking study by Johansen (1960), development and application of CGE models has become a rapidly growing field in economics research (Bergman, 1982).

Along with quantitative results based on the theory of general equilibrium, CGE analysis provides many insights into the factors and mechanisms that determine relative prices and the allocation of resources within and between market economies. It is a useful tool for long-term economic forecasting and economic policy evaluation for three reasons: (1) its consistency with other types of analysis, (2) CGE models can overcome particular problems such as some structural rigidities and institutional constraints that other models fail to capture, and, (3) CGE models provide consistent frameworks to assess the linkage and tradeoffs among different policy packages (Devarajan and Robinson, 2002).

A few decades after introduction by Johansen, the use of CGE models became quite popular. They were embraced by the world's premier policy research institutions. They are a primary tool in institutions such as the World Bank, International Food Policy Research Institute (IFPRI), and the Center for Global Trade and Analysis, Purdue University.

2.3 Limitations of the Computable General Equilibrium Model

The drawbacks of CGE model are generally threefold. The first limitation comes from the principles of model construction. CGE models are used to quantify the impact of specific policies on the equilibrium allocation of resources and relative prices of goods and factors of demand. Therefore, they do not perform well in determining nominal variables such as prices and exchange rates (Bergman and Henrekson, 2003). Second, static CGE models have neither intertemporal nor probability characteristics since they were developed using data from a single reference or benchmark period. Lastly, a SAM table, which is the prime data resource needed to build a CGE model, is required to be consistent with other national economic accounts and updated regularly.

2.4 Components of the Computable General Equilibrium (CGE) Model

The standard CGE model has three major components. These are a Social Accounting Matrix (SAM), the model, i.e. the system of equations characterizing market behavior**,** and lastly the closure rule. (Manopiniwes, 2005).

2.4.1 Social Accounting Matrix (SAM)

The Social Accounting Matrix (SAM) is the most important information resource used to construct a CGE model. A SAM is a particular representation of the macro and mesoeconomic accounts of a socio-economic system, which capture the transactions and transfers between all economic agents in the system (Pyatt and Round, 1985; Reinert and Roland-Holst, 1997). A SAM features a square table where economic agents and activities

located on columns represent the spenders and ones in rows represent the recipients and *vice versa* for goods. It is consistent with other economic accounts. The SAM framework is not only square but corresponding row and column totals must be equal (Round, 2003).

The CGE model used in this study was developed from data presented in the Thai Social Accounting Matrix (SAM) table of the year 2006, obtained from the office of the National Economics and Social Development Board (NESDB), Thailand. The 2006 SAM table has a size of 192 accounts by 192 accounts. It contains

- Two production factors, i.e., labor and capital
- 58 production sectors
- 58 domestic intermediate inputs and 58 imported intermediate inputs
- Trade and transport margin
- Five types of taxes, i.e., direct tax, value-added tax, exercise tax, tariff, and other indirect taxes, a subsidy
- Five types of households categorized by income level
- Each one with government, private and state-own enterprises
- Rest of the world
- Capital accounts

The SAM table is illustrated in Table 2.1.

Table 2.1: The Social Accounting Matrix (SAM) for 2006

	Labor	Capital	Productions	Domestic Intermediate Inputs	Import Intermediate inputs	TTM	DIRTAX	VAT	EXCSTAX	TARIIF	OINDTAX	SUBY	Households	Government	Firms	ROW	Capital Account
Labor			Value Added (Labor)														
Capital			Value Added (Capital)														
Productions				Production Output													
Domestic Intermediate Inputs			Domestic Intermediate Inputs										Household Consumption	Government Consumption	Private Consumption	Export	Investment Expenditure
Import intermediate Inputs			Import intermediate Inputs														
TTM				Trade and Transport Margin (Domestic Intermediate Inputs)	Trade and Transport Margin (Import Intermediate Inputs)												
DIRTAX													Income Taxes		Corporate Taxes		
VAT			Value Added Taxes														
EXCSTAX				Exercise Taxes													
TARIIF					Tariffs												
OINDTAX				Indirect Taxes													
SUBY														Subsidy Expenditure			
Households	Factor of Income (Labor)	Factor of Income (Capital)											Institutional Transfer Payments				
Government						TTM Revenue	Income Tax Revenue	Value Added Tax Revenue	Ecercise Taxes Revenue	Tariff Revenue	Indirect Tax Revenue						
Firms																	
ROW					Import												
Capital Account													Household Saving	Government Budget	Firms Saving	Capital Inflow	

Source: National Economics and Social Development Board, Thailand

2.4.2 System of Equations

The system of equations that is used to construct the model in this study follows the standard CGE framework of IFPRI (Lofgren et al., 2002). It has 6 blocks of data, i.e., Price, Distortion, Production, Income, Expenditure, and Market Clearing. Subscript notation and the equations in each block are discussed below.

To fully understand the meaning of each equation, it is essential to know the subscript notation for different sets of variables. Subscripts "*i*" and "*j*" represent the production sector/activity. The factor of production is noted in subscript "*f*" of which contains two subsets, labor "*fl*" and capital "*fc*". The intermediate inputs for production are distinguished by the subscripts for domestic intermediate inputs "*dcom*" and imported intermediate inputs "*mcom*". The institution set is composed of eight types of economic agents with the subscript "*in*". Of these, seven are domestic institutions denoted by "*din*" and one is foreign institution is denoted by "*fr*". Seven domestic institutions are divided into 5 groups of households, a government, and private and public enterprises which have subscripts of "*h*", "*gin*", and "*pin*" or "*nno*" respectively. Lastly, household and private and public enterprises are grouped in to non-government domestic institutions which used "*ngi*" subscript. The coordinate of subscript identifies capital inflow from the later to the former subscript, in other words, goods outflow in a manner defined by the former to the later subscript.

(1) The Price Block consists of equations that are computed for the prices of all commodities, activities, and factors of production at equilibrium. The prices determined are output (PX), valued added (PV), intermediate composite inputs (PINTM), domestic intermediate inputs (PDINTM), import intermediate inputs (PFINTM), composite goods (PQ), domestic goods (PD), export goods (PE), import goods (PM),the world prices of imports (PWE), the world prices of exports(PWE), the prices of capital (PK),and price index(PINDEX).

Table 2.2: Equations of the Price Block

(2.2.1) $PM_i = PWM_i EXR(1 + TM_i + TTF_i - PSUBM_i)$

(2.2.2) $PE_i = \dfrac{PWE_i EXR}{(1 - PSUBE_i)}$

(2.2.3) $PQ_i Q_i = PD_i D_i + PM_i M_i$

(2.2.4) $PX_i X_i = (1 - TEXCS_i - TOINDEX_i - TTD_i - IMPF_i)PD_i D_i + PE_i E_i + SUB_i$

(2.2.5) $PV_i VA_i (1 - TVAT_i) = PX_i X_i - PINTM_i INTM_i - VAT_i$

(2.2.6) $PINTM_i INTM_i = PDINTM_i DINTM_i + PFINTM_i FINTM_i$

(2.2.7) $PDINTM_i = \sum_j AAD_{j,i} PD_j$

(2.2.8) $PFINTM_i = \sum_j AAF_{j,i} PM_j$

(2.2.9) $PK_i = \sum_j PQ_j CAPMAT_{j,i}$

(2.2.10) $PINDEX = \dfrac{GDP}{RGDP}$

Table 2.3: Price Block Nomenclature

	Nomenclature
D_i	Domestic goods of sector *i* sold domestically
$DINTM_i$	Domestic intermediate input of sector *i*
E_i	Export quantity of sector *i*
EXR	Exchange rate
$FINTM_i$	Import intermediate input Imperfect competition coefficient
GDP	Gross domestic product
$INTM_i$	Intermediate composite good of sector *i*
$IMPF_i$	Imperfect competition coefficient of sector *i*
PD_i	Price of domestic goods of sector *i* sold domestically
$PDINTM_i$	Price of domestic intermediate input of sector *i*
PE_i	Price of export quantity of sector *i*
$PFINTM_i$	Price of import intermediate input of sector *i*
$PINDEX$	Price index
$PINTM_i$	Price of intermediate composite good of sector *i*
PK_i	Price of capital by sector of destination
PM_i	Price of import good of sector *i*
PQ_j	Price of composite good of sector *i*
$PSUBE_i$	Subsidy for export to sector *i*
$PSUBM_i$	Subsidy for import to sector *i*
PV_i	Price of value-added of sector *i*
PWE_i	World price of export of sector *i*
PWM_i	World price of import of sector *i*
PX_i	Domestic output of sector *i*
$RGDP$	Real Gross domestic product
SUB_i	Sectoral subsidy
$TEXCS_i$	Rate of exercise tax of sector *i*
TM_i	Tariff rates on import of sector *i*
$TOINDEX_i$	Rate of other indirect tax of sector *i*
TTD_i	Domestic trade and transport margin of sector *i*

Table 2.3: Price Block Nomenclature (Continued)

TTF_i	Import trade and transport margin of sector *i*
$TVAT_i$	The rate of Value-added tax of sector *i*
VA_i	Value-added of sector *i*
VAT_i	Value-added tax of sector *i*
X_i	Domestic output of sector *i*
$aad_{j,i}$	Domestic good input-output coefficient between sector *j* and sector *i*
$aaf_{j,i}$	Imported good input-output coefficient between sector *j* and sector *i*
$capmat_{j,i}$	Capital matrix between sector *j* and sector *i*
i / j	Activity or Sector

Equation (2.2.1) gives the import price (PM_i) paid by domestic producers in local currency. The value in the bracket identifies the constant terms incurred by import activity which include tariff on imports (TM_i), import trade transport and margin (TTF_i), and import subsidy share ($PSUBM_i$). The export price (PE_i) is the price that domestic producers received when they sell their commodity abroad determined using Equation (2.2.2). The balance of composite goods prices and quantity is given by Equation (2.2.3) as well as the balance of output price and quantity in Equation (2.3.4). The value added is the leftover of total value of output subtracted by total value of intermediate input and value added tax (VAT_i). The balance of intermediate goods and value-added is found using Equation (2.3.5). The definition of prices of domestic intermediate inputs ($PDINTM_i$), the prices of import intermediate inputs ($PFINTM_i$), and the prices of capital (PK_i) are determined by Equations (2.3.6), (2.3.7) and (2.3.8), respectively. $AAD_{j,i}$ represents the matrix of input-output coefficients for domestic goods and $AAF_{j,i}$ represents the matrix of input-output coefficients for

imported goods. $CAPMAT_{j,i}$ is a capital composition matrix. Lastly, the price index is a ratio of Gross Domestic Product (GDP) and Real Gross Domestic Product (RGDP).

(2) The distortion block provides the definitions of the various distortion variables in the CGE model. The trade transport and margin on domestic goods ($DTTM_i$) is explicitly evaluated using Equation (2.3.1) as the product of domestic trade transport and margin (TTD_i), the constant parameters, and the total value of domestic production ($PD_i.D_i$). A similar method is used to find excise tax ($EXCSTAX_i$), other indirect taxes ($OINDTAX_i$), and imperfect competition distortion ($IMPERFECT_i$) as shown in Equations (2.3.2), (2.3.3), and (2.3.4), respectively. The trade transport and margin on import goods($FTTM_i$) is derived from Equation (2.3.5) which changes due to total value of imported goods ($PWM_i.M_i$), exchange rate(EXR), and the import trade transport and margin (TTF_i) as well as tariff ($TARIFF_i$) and import subsidy share($PSUBM_i$) in Equations (2.3.6) and (2.3.7). Equation (2.3.8) shows the quantity of value-added tax (VAT_i) is the product of value added tax ($TVAT_i$) and the total value of value-added ($PV_i.V_i$).Subsidy for export ($SUBE_i$) is determined in Equation (2.3.8) as export subsidy share ($PSUBE_i$) times the total value of export goods ($PE_i.E_i$).

Table 2.4: Equations of the Distortion Block

(2.3.1) $DTTM_i = TTD_i PD_i D_i$

(2.3.2) $EXCSTAX_i = TEXCS_i PD_i D_i$

(2.3.3) $OINDTAX_i = TOINDTAX_i PD_i D_i$

(2.3.4) $IMPERFECT_i = IMPF_i PD_i D_i$

(2.3.5) $FFTM_i = TTF_i PWM_i M_i EXR$

(2.3.6) $TARIFF_i = TM_i PWM_i M_i EXR$

(2.3.7) $SUBM_i = PSUBM_i PWM_i M_i EXR$

(2.3.8) $VAT_i = TVAT_i PV_i VA_i$

(2.3.9) $SUBE_i = PSUBE_i PE_i E_i$

Table 2.5: Distortion Block Nomenclature

	Nomenclature
D_i	Domestic goods of sector *i* sold domestically
$DTTM_i$	Paid trade and transport margin on sector *i* domestic commodity
$EXCSTAX_i$	Exercise tax of sector *i*
EXR	Exchange rate
$FFTM_i$	Paid trade and transport margin on sector *i* imported commodity
$IMPERFECT_i$	Imperfect competition distortion of sector *i*
$IMPF_i$	Imperfect competition coefficient of sector *i*
M_i	Import quantity of commodities in sector *i*
$OINDTAX_i$	Other indirect tax of sector *i*
PD_i	Price of domestic goods of sector *i* sold domestically
$PSUBE_i$	Subsidy for export to sector *i*
$PSUBM_i$	Subsidy for import to sector *i*
PWM_i	World price of import of sector *i*
$SUBE_i$	Sectoral subsidy of export commodity of sector *i*
$SUBM_i$	Sectoral subsidy of import commodity of sector *i*

Table 2.5: Distortion Block Nomenclature (Continued)

$TARIFF_i$	Tariff of sector *i* commodity
$TEXCS_i$	Rate of exercise tax of sector *i* commodity
TM_i	Tariff rates on import of sector *i*
$TOINDTAX_i$	Rate of other indirect tax of sector *i*
TTD_i	Domestic trade and transport margin of sector *i*
TTF_i	Import trade and transport margin of sector *i*
$TVAT_i$	The rate of Value-added tax of sector *i*
VAT_i	Value-added tax of sector *i*
i / *j*	Activity or Sector

(3) The quantity of outputs of each production activity is determined in the production block. Here, each producer presented with a choice of activities in which to engage is assumed to act so as to maximize profits, defined as the difference between revenue and cost of valued-added and intermediate inputs. Figure 2.1 shows the hierarchy of production activities linked by the set of equations in this block. Starting from the bottom left, the domestic intermediate input ($DINTM_i$) and import intermediate inputs ($FINTM_i$) are combined into intermediate input ($INTM_i$) using the Constant Elasticity of Substitution (CES) function shown in Equation (2.4.1). The parameters, bt_i and ρ_i^t, show the share and elasticity parameters of substitutability between foreign and domestic inputs. In the case that sectoral intermediate input requires only domestic intermediate goods, Equation (2.4.2) is used. Equation (2.4.3) is derived from maximizing Equation (2.4.1) based upon Equation (2.2.6) to determine the optimal mixed quantity of domestic and intermediate inputs ($DINTM_i$) and import intermediate inputs ($FINTM_i$)

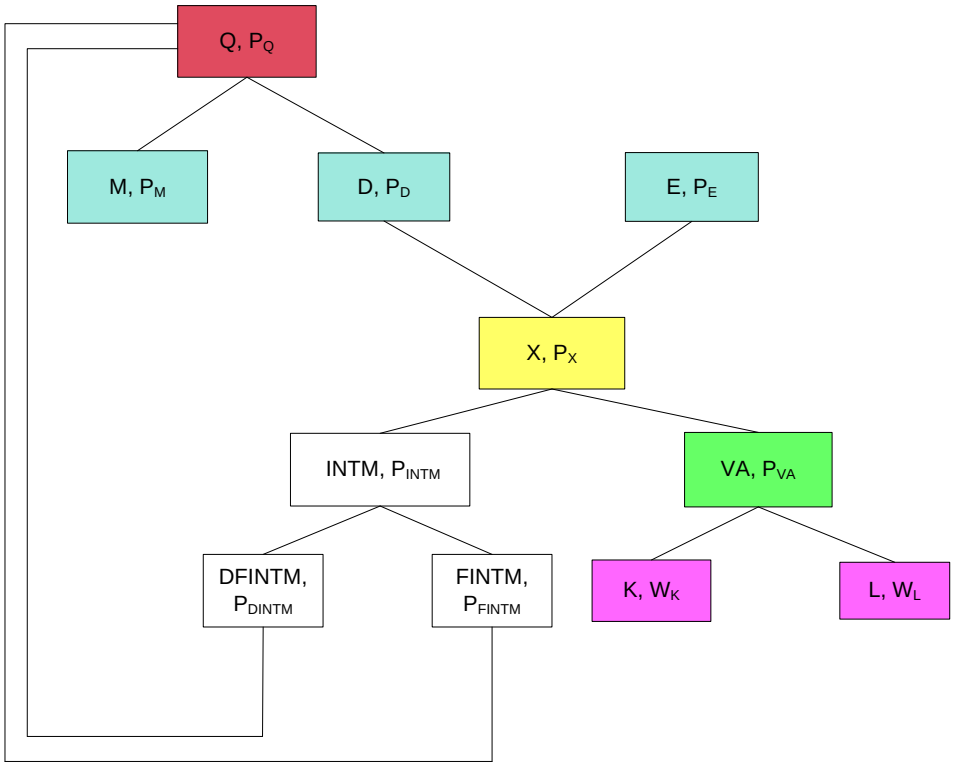

Figure 2.1: The Structure of the Production Block

Table 2.6: Equations of the Production Block

(2.4.1) $$INTM_i = at_i\left[bt_i DINTM_i^{-\rho_i^t} + (1-bt_i)FINTM_i^{-\rho_i^t}\right]^{-\frac{1}{\rho_i^t}}$$

(2.4.2) $$INTM_i = DINTM_i$$

(2.4.3) $$FINTM_i = DINTM_i\left(\frac{PDINTM_i}{PFINTM_i}\right)\left(\frac{1-bt_i}{bt_i}\right)^{\frac{1}{1+\rho_i^t}}{}_i$$

(2.4.4) $$VA_i = avx_i av_i\left[\sum_f bv_{i,f} FACDEM_{i,f}^{-\rho_i^v}\right]^{-\frac{1}{\rho_i^v}}$$

(2.4.5) $$WFDIST_{if} WF_f = \frac{PV_i(1-TVAT_i)VA_i bv_{i,f} FACDEM_{if}^{-\rho_i^v}}{\sum_f bv_{i,f} FACDEM^{-\rho_i^v}}$$

(2.4.6) $$WF_{labor} = WF0_{labor}\sum_i WAGES_i wlshare_{i,labor}$$

(2.4.7) $$WAGES_i = PINDEX^{vp_i}\left(\frac{PV_i}{PV0_i}\right)^{(1-vp_i)}\left(\frac{X_i}{PDL0_i\cdot\sum_f FACDEM_{i,f}}\right)^{phi_i}$$

(2.4.8) $$X_i = ai_i\left[bi_i VA_i^{-\rho_i^i} + (1-bi_i)INTM_i^{-\rho_i^i}\right]^{-\frac{1}{\rho_i^i}}$$

(2.4.9) $$INTM_i = VA_i\left[\left(\frac{PV_i}{PINTM_i}\right)\left(\frac{1-bi_i}{bi_i}\right)\right]^{\frac{1}{1+\rho_i^i}}$$

(2.4.10) $$X_i = ax_i\left[bx_i D_i^{\rho_i^x} + (1-bx_i)E_i^{\rho_i^x}\right]^{\frac{1}{\rho_i^x}}$$

(2.4.11) $$X_i = D_i$$

(2.4.12) $$E_i = D_i\left[\left(\frac{PE_i}{(1-TEXCS_i - TOINDTAX_i - TTD_i - IMPF_i)PD_i}\right)\left(\frac{bx_i}{1-bx_i}\right)\right]^{\frac{1}{\rho_i^x-1}}$$

(2.4.13) $$E_i = ECON_i\left(\frac{PWE_i}{PWSE_i}\right)^{-eta_i}$$

(2.4.14) $$Q_i = aq_i\left[bq_i D_i^{-\rho_i^q} + (1-bq_i)M_i^{-\rho_i^q}\right]^{-\frac{1}{\rho_i^q}}$$

(2.4.15) $$Q_i = D_i$$

(2.4.16) $$M_i = D_i\left[\left(\frac{PD_i}{PM_i}\right)\left(\frac{1-bq_i}{bq_i}\right)\right]^{\frac{1}{1+\rho_i^q}}$$

(2.4.17) $$INTQ_i PQ_i = \sum_i (aad_{i,j} DINTM_i PDINTM_i + aaf_{i,j} FINTM_i PFINTM_i)$$

(2.4.18) $$TTM_i = DTTM_i + FTTM_i$$

(2.4.19) $$TTMX_i = TTX_i\sum_i TTM_i$$

Table 2.7: Production Block Nomenclature

	Nomenclature
D_i	Domestic goods of sector *i* sold domestically
$DINTM_i$	Domestic intermediate input of sector *i*
$DTTM_i$	Paid trade and transport margin on sector *i* domestic commodity
E_i	Export quantity of sector *i*
$ECON_i$	A constant of export demand by sector *i*
$FACDEM_{i,f}$	Factor of demand required from factor of production to sector *i*
$FINTM_i$	Import intermediate input Imperfect competition coefficient
$FTTM_i$	Paid trade transport and margin on imported commodity of sector *i*
$INTM_i$	Intermediate composite good of sector *i*
$INTQ_i$	Supply of intermediate goods from sector *i*
$IMPF_i$	Imperfect competition coefficient of sector *i*
M_i	Import quantity of commodities in sector *i*
PD_i	Price of domestic goods of sector *i* sold domestically
$PDINTM_i$	Price of domestic intermediate input of sector *i*
$PDL0_i$	Initial sectoral average productivity
PE_i	Price of export quantity of sector *i*
$PFINTM_i$	Price of import intermediate input of sector *i*
$PINDEX$	Price index
PM_i	Price of import good of sector *i*
PQ_i	Price of composite good of sector *i*
PV_i	Price of value-added of sector *i*
$PV0_i$	Initial price of value-added of sector *i*
PWE_i	World price of export of sector *i*
$PWSE_i$	World market price of export substitutes of goods of sector *i*
Q_i	Quantity of composite goods of sector *i*
$TEXCS_i$	Rate of exercise tax of sector *i* commodity
$TOINDTAX_i$	Rate of other indirect tax of sector *i*
TTD_i	Domestic trade and transport margin of sector *i*

Table 2.7: Production Block Nomenclature (Continued)

TTM_i	Import trade and transport margin of sector *i*
$TTMX_i$	Received trade and transport margin of sector *i*
TTX_i	Export trade and transport margin of sector *i*
$TVAT_i$	The rate of Value-added tax of sector *i*
VA_i	Value-added of sector *i*
$WAGES_i$	Sectoral wages
WF_f	Factors of production (labor and capital) price
WF_{labor}	Factors of production (labor) price
$WF0_{labor}$	Initial factors of production (labor) price
$WFDIST_{i,f}$	Factors of production price distribution by sector *i*
X_i	Domestic output of sector *i*
$aad_{i,j}$	Domestic good input-output coefficient between sector *j* and sector *i*
$aaf_{i,j}$	Imported good input-output coefficient between sector *j* and sector *i*
aq_i	Shift parameters of Armington domestic and import intermediate input function of sector *i*
at_i	Shift parameters of Armington value-added and factor demand function of sector *i*
av_i	Shift parameters of Armington value-added and intermediate input function of sector *i*
avx_i	A constant value of value-added and factor demand by sector*i*
ax_i	Shift parameters of Armington domestic and import goods function of sector *i*
bq_i	Share parameter of Armington domestic and import function of sector *i*
bt_i	Share parameter of Armington value-added and factor demand function of sector *i*
$bv_{i,f}$	Share parameters of Armington value-added and intermediate input function of sector *i*
bx_i	Share parameters of Armington domestic and import goods function of sector *i*
eta_i	Elasticity parameter of capacity utilization and investment
phi_i	Sectoral wage function elasticity of average productivity
vp_i	Sectoral wage function elasticity of price index
$wlshare_{i,labor}$	Sectoral weight of labor wage

Table 2.7: Production Block Nomenclature (Continued)

ρ_i^q	Elasticity parameters of Armington domestic and import function of sector *i*
ρ_i^t	Elasticity parameters of Armington domestic and import intermediate composite function of sector *i*
ρ_i^v	Elasticity parameters of Armington value-added and factor demand function of sector *i*
ρ_i^x	Elasticity parameters of CET domestic and export function of sector *i*
capital	Capital
f	Factors of production: Labor and Capital
i	Activity or Sector
labor	Labor

On the bottom right of Figure 2.1, capital (K) and labor (L) are used as factor demands ($FACDEM_{i,f}$) to determine the quantity of value-added (VA_i) as shown in Equation (2.4.4). Factor price (WF_f) and price of labor (WF_{labor}) are determined using Equations (2.4.5) and (2.4.6). The definition sectoral wage (W_i) is shown in (2.4.7). Value-added (VA_i) and intermediate input ($INTM_i$) are aggregated into domestic output (X_i) utilizing the CES function in Equation (2.4.8). Equation (2.2.9) is derived from the maximization of Equation (2.4.8) subject to Equation (2.2.5) and is then used to determine the optimal proportion of value-added (VA_i) and intermediate input ($INTM_i$) in production. The domestic output of sector *j* (X_i) is either consumed domestically (D_i) or exported to foreign countries (E_i) as shown in Constant Elasticity of Transformation (CET) Equation (2.4.10). For any particular sector, if the domestic output (X_i) is entirely consumed within the country, Equation (2.4.11) is used. The export quantity is determined using Equation (2.4.12) or (2.4.13) where Equation (2.4.12) is derived from the maximization of (2.4.10) based upon equation (2.2.4). At the top of Figure 2.1, composite goods (Q_i) are manufactured from domestically

consumed goods (D_i) and imported goods (M_i) as is seen in Equation (2.4.14). In case only domestically consumed goods (D_i) are used to produce composite goods (Q_i), Equation (2.4.15) is used in place of Equation (2.4.14). The quantity of imported goods in sector *i* (M_i) is derived using Equation (2.4.16), which results from the maximization of equation (2.4.14) subject to Equation (2.2.3). The total composite output ($PQ_i.Q_i$) of sector *i* is the sum of total domestic intermediate inputs ($DINTM_i.PDINTM_i$) and total imported intermediate inputs ($FINTM_i.PFINTM_i$), which are equal in Equation (2.4.17). The definitions of paid trade and transport margin (TTM_i) and received trade and transport margin ($TTMX_i$) are given in Equations (2.4.16) and (2.4.17).

(4) The income block provides information about income sources of all relevant economic agents. Economic agents which are defined in Section 1 represent 4 major groups: households, governments, private and state-owned enterprises, and foreign institutions. Households and private and state-owned enterprises, which are non-governmental institutions, are denoted by subscript "*ngi*". Their income is derived from their 2 production factors, i.e., capital and labor as well as subsidies. Equation (2.5.1) represents total income of each factor (YF_f), which is the sum of total factors of production demand ($WF_f \cdot WFDIST_{i,f} \cdot FACDEM_{i,f}$) from each sector "i" and total factors of income from foreign institutions ($YFROW_{f,fr}$). The household income as well as that of private and state-own enterprises is determined using Equation (2.5.2) by summation of total factor income ($FACTORIN_{ngi,f}.YF_f$) and transfer payments from all institutions ($ITRAN_{ngi,in}$). Governments receives their revenue from total factor income ($FACTORIN_{gin,f}.YF_f$) and various taxes on each business sector (VAT_i,

$EXCTAX_i$, $ONIDTAX_i$, $TARIFF_i$, and $DIRTAX_{ngi}$) as well as fixed-payments from other institutions ($ITRAN_{gin,in2}$) as shown in Equation (2.5.3). The direct tax on domestic institutions ($DIRTAX_{din}$) is proportional to their income ($DTAX_{din}.INC_{din}$) as shown in Equation (2.5.4). As can be seen in Equation (2.5.5), foreign institutions derive their revenues from total factor of income ($FACTORIN_{gin,f}.YF_f$ **)**, fixed transfer payments from other institutions ($ITRAN_{fr,ins}$), and the share of imports ($PWM_i.M_i.EXR$).

Table 2.8: Equations of the Income Block

(2.5.1) $$YF_f = \sum_i WF_f WFDIST_{i,f} FACDEM_{i.f} + \sum_{fr} YFROW_{f,fr}$$

(2.5.2) $$INC_{ngi} = \sum_f FACTOIN_{ngi,f} YF_f + \sum_{in} ITRAN_{ngi,in}$$

(2.5.3) $$INC_{gin} = \sum_f FACTOIN_{gin,f} YF_f + \sum_{in2} ITRAN_{gin,in2} + gishr_{gin} \sum_i (VAT_i + EXCSTAX_i + OINDTAX_i + TARIFF_i) + gishr_{gin} \sum_{ngi} DIRTAX_{ngi}$$

(2.5.4) $$DIRTAX_{din} = DTAX_{din} INC_{din}$$

(2.5.5) $$INC_{fr} = \sum_f FACTOIN_{fr,f} YF_f + \sum_{in2} ITRAN_{fr,in2} + MRSHR_{fr} \sum_i PWM_i M_i EXR$$

Table 2.9: Income Block Nomenclature

	Nomenclature
$DIRTAX_{din}$	Direct /income tax of domestic institutions
$DIRTAX_{ngi}$	Direct /income tax of non-government domestic institutions
$DTAX_{din}$	Direct /income tax rate of domestic institutions
$EXCSTAX_i$	Exercise tax of sector *i* commodity
EXR	Exchange rate
$FACTOIN_{fr,f}$	Factor of income required from factor of production to foreign institution

Table 2.9: Income Block Nomenclature (Continued)

$FACTOIN_{gin,f}$	Factor of income required from factor of production to government
$FACDEM_{i,f}$	Factor of demand required from factor of production to sector i
$FACTOIN_{ngi,f}$	Factor of income required from non-government domestic institutions to foreign institution
INC_{din}	Domestic institutions' revenue
INC_{fr}	Foreign institution's revenue
INC_{gin}	Government's revenue
INC_{ngi}	Non-government domestic institutions' revenue
$ITRAN_{fr,in2}$	Transfer payment from foreign institution's to all institutions
$ITRAN_{gin,in2}$	Transfer payment from government to all institutions
$ITRAN_{ngi,in}$	Transfer payment from non-government domestic institutions to all institutions
M_i	Import quantity of commodities in sector i
$MRSHR_{fr}$	Import share of foreign institution (fr) by import commodity
$OINDTAX_i$	Other indirect tax of sector i
PWM_i	World price of import of sector i
$TARIFF_i$	Tariff of sector i commodity
VAT_i	Value-added tax of sector i
WF_f	Factors of production price
$WFDIST_{i,f}$	Factors of production price distribution by sector i
YF_f	Factors of income from factors of production
$YFROW_{f,fr}$	Factors of income from aboard
$gishr_{gin}$	Government agencies' share of collected indirect tax
din	Domestic institutions: household, government, and private and public enterprises
f	Factors of production: Labor and Capital
fr	Foreign institution
gin	Government
i / j	Sector or activities
$in / in2$	All institutions
ngi	Non-government domestic institutions: Household, private and public enterprise

(5) The expenditure block contains the consumption expenses of each economic agent. The capital account, which is savings and investments, is also represented in this block. Equation (2.6.1) shows household consumption ($YCONS_h$) which is the portion of income after taxes ($(1-MPS_h).(INC_h-DIRTAX_h)$)from which two constant transfer payments are subtracted. Household expenditures are broken down into 5 elements. These are household consumption ($YCONS_h$), direct/income tax ($DIRTAX_{din}$), and 3 transfer payments as described in Equation (2.6.2). Government expenditures (EXP_{gin}) are shown in Equation (2.6.3) These have 3 components, proportion of total government demand ($PQ_i.GD_i$), total of transfer payment ($ITRAN_{in,gin}$), and 3 types of subsidies ($SUB_i+SUBE_i+SUBM_i$). Expenditures of private and state-own enterprises (EXP_{nno}) are calculated from transfer payments ($ITRAN_{in,nno}$) , and direct taxes ($DIRTAX_{nno}$), as shown in Equation (2.6.4). Equation (2.6.5) gives foreign institution expenses composed of a proportion of total export ($PWE_i.E_i.EXR$), factor of income from aboard ($YFROWf_{f,fr}$), and expenditure to other institutions ($ITRAN_{in,fr}$).Equations (2.6.6) and (2.6.7) define saving of domestic and foreign institution and is simply obtained by subtracting expenditures from income. Equation (2.6.8) gives total saving (SAVING) while Equation (2.6.9) shows total private consumption demand ($CD_i.PQ_i$). Equation (2.6.10) expresses the full amount of capital demanded by each sector ($PK_i.DK_i$). Equation (2.6.11) defines the investment demand derived from the capital matrix ($CAPMAT_{i,j}$) times quantity of capital demand by each sector (DK_i).

Table 2.10: Equations for the Expenditure Block

(2.6.1) $YCONS_h = (1 - MPS_h)(INC_h - DIRTAX_h) - \sum_{ngi} ITRAN_{ngi,h} - \sum_{fr} ITRAN_{fr,h}$

(2.6.2) $EXP_h = YCONS_h + DIRTAX_h + \sum_{ngi} ITRAN_{ngi,h} + \sum_{fr} ITRAN_{fr,h} + \sum_{gin} ITRAN_{gin,h}$

(2.6.3) $EXP_{gin} = ggshr_{gin} \sum_i PQ_i GD_i + \sum_{in} ITRAN_{in,gin} + gsshr_{gin} \sum_i (SUB_i + SUBE_i + SUBM_i)$

(2.6.4) $EXP_{nno} = \sum_{in} (ITRAN_{in,nno} + DIRTAX_{nno})$

(2.6.5) $EXP_{fr} = ershr_{fr} \sum_i PWE_i E_i EXR + \sum_f YFROW_{f,fr} + \sum_{in} ITRAN_{in,fr}$

(2.6.6) $SAV_{din} = INC_{din} - EXP_{din}$

(2.6.7) $SAV_{fr} = INC_{fr} - EXP_{fr}$

(2.6.8) $SAVING = \sum_{in} SAV_{in}$

(2.6.9) $CD_i PQ_i = \sum_h alphaq_{i,h} YCONS_h$

(2.6.10) $PK_i DK_i = kshr_i INVEST$

(2.6.11) $ID_i = \sum_j CAPMAT_{i,j} DK_j$

Table 2.11: Expenditure Block Nomenclature

	Nomenclature
$CAPMAT_{i,j}$	Capital matrix between all sectors
CD_i	Private consumption demand for sector *i*
$DIRTAX_h$	Households' income tax
$DIRTAX_{nno}$	Private and public enterprise's income tax
DK_i / DK_j	Quantity of capital by sector*i*
E_i	Export quantity of sector *i*
EXP_{din}	Domestic institutions' expenditure
EXP_{gin}	Government's expenditure
EXP_h	Households' expenditure
EXP_{nno}	Private and public enterprise's expenditure
EXP_{fr}	Foreign institution's expenditure
EXR	Exchange rate

Table 2.11: Expenditure Block Nomenclature (Continued)

GD_i	Government consumption demand from sector *i*
ID_i	Sectoral investment demand
INC_{din}	Domestic institutions' revenue
INC_{fr}	Foreign institution's revenue
INC_h	Households' revenue
$ITRAN_{fr,h}$	Transfer payment from foreign institution's to all households
$ITRAN_{gin,h}$	Transfer payment from government to all households
$ITRAN_{in,fr}$	Transfer payment from all institutions to foreign institution's
$ITRAN_{in,nno}$	Transfer payment from all institutions to private and public enterprise
$ITRAN_{ngi,h}$	Transfer payment from non-government domestic institutions to all households
$INVEST$	Total notational investment
MPS_h	Marginal Propensity to save of households (*h*)
PK_i	Price of capital by sector of destination
PQ_i	Export quantity of sector *i*
PWE_i	World price of export of sector *i*
SAV_{din}	Domestic institutions' saving
SAV_{fr}	Foreign institution's saving
SAV_{in}	All institution saving
$SAVING$	Total national saving
SUB_i	Sectoral subsidy
$SUBE_i$	Subsidy for export to sector *i*
$SUBM_i$	Subsidy for import to sector *i*
$YCONS_h$	Consumption by households
$YFROW_{f,fr}$	Factor of income (*f*) from foreign institution(*fr*)
$alphaq_{i,h}$	The ratio explains of households (*h*) demand for composite good *i*
$ershr_{fr}$	Export share of foreign institution(*fr*) by export commodity
$ggshr_{gin}$	Government agencies' share of expenditure
$gsshr_{gin}$	Government agencies' share of paid subsidy
$kshr_i$	Capital investment share of sector *i*

Table 2.11: Expenditure Block Nomenclature (Continued)

din	Domestic institutions: household, government, and private and public enterprises
f	Factors of production: Labor and Capital
fr	Foreign institution
gin	Government
h	5 typed of households
i / *j*	Sector or activities
in	All institutions
ngi	Non-government domestic institutions: Household, private and public enterprise
nno	Private and public enterprise

(6) The market clearing block contains all balances in the economic system. The definition of GDP and real GDP also appear in this block. Equation (2.7.1) shows the balance of goods. On the left side of equation is the demand for goods while on the right side is the total supply of goods. Total factors of production supply (FS_f), total labor supply (LSUP), and capital supply (CSUP) are defined in Equations (2.7.2), (2.7.3), and (2.7.4) respectively. The rate of unutilized capacity (CAPUNR) is expressed in Equation (2.7.5). The WALRAS variable gives the difference between total savings (SAVING) and total investments (INVEST). The balance of exported goods quantity (TOTALE), import goods quantity (TOTALM) and private consumption demand are (TOTALC) as shown in Equations (2.7.7), (2.7.8), and (2.7.9). GDP is measured using a value-added approach while RGDP is aggregate demand (CD_i+ID_i+GD_i) plus total exports (E_i) and the total imports after application of the real trade transport and margin((1-$TMREAL0_i$).M_i).

Table 2.12: Equations of the Market Clearing Block

(2.7.1) $Q_i PQ_i = INTQ_i + CD_i + GD_i + ID_i + TTMX_i$

(2.7.2) $FS_f = \sum_i FACDEM_{i,f}$

(2.7.3) $LSUP = (1 + UEMPR) \sum_{labor} FS_{labor}$

(2.7.4) $CSUP = (1 + CAPUNR) \sum_{capital} FS_{capital}$

(2.7.5) $CAPUNR = CAPCON\left(\frac{INVEST}{INVEST0}\right)^{-etac}$

(2.7.6) $WALRAS = SAVING - INVEST$

(2.7.7) $TOTALE = \sum_i E_i$

(2.7.8) $TOTALM = \sum_i M_i$

(2.7.9) $TOTALC = \sum_i CD_i$

(2.7.10) $GDPY = \sum_i PV_i VA_i + EXCSTAX_i + OINDTAX_i + TARIFF_i - SUB_i - SUBM_i$

(2.7.11) $RGDP = \sum_i (CD_i + ID_i + GD_i) + \sum_i E_i + \sum_i (1 - TMREAL0_i) M_i$

Table 2.13: Market Clearing Block Nomenclature

	Nomenclature
$CAPUNR$	Rate of unutilized capacity
CD_i	Private consumption demand for sector i
$CSUP$	Total capital stock
E_i	Export quantity of sector i
$EXCSTAX_i$	Exercise tax of sector i commodity
$FACDEM_{i,f}$	Factor demand for labor and capital of sector$i$
$FS_{capital}$	Factor supply of capital
FS_f	Factor supply of capital and labor
FS_{labor}	Factor supply of labor
GD_i	Government consumption demand from sector i

Table 2.13: Market Clearing Block Nomenclature (Continued)

GDP	Gross domestic product
ID_i	Sectoral investment demand
$INTQ_i$	Supply of intermediate goods from sector i
$INVEST$	Total notational investment
$INVEST0$	Initial total notational investment
$LSUP$	Total labor supply
M_i	Import quantity of commodities in sector i
$OINDTAX_i$	Other indirect tax of sector i
PQ_i	Price of composite good of sector i
PV_i	Price of value-added of sector i
Q_i	Quantity of composite goods of sector i
$RGDP$	Real Gross domestic product
SUB_i	Sectoral subsidy
$SUBM_i$	Sectoral subsidy of import commodity of sector i
$TARIFF_i$	Tariff of sector i commodity
$TMREAL0_i$	Initial trade, transport, and margin real value
$TOTALC$	Total value of consumption demand
$TOTALE$	Total value of export
$TOTALM$	Total value of import
$TTMX_i$	Revived trade, transport margin value
$UEMPR$	Unemployment rate
VA_i	Value-added of sector i
$WALRAS$	Dummy variable for Walras law
$capcon$	A constant term of capacity utilization
$etac$	Elasticity of investment and capacity utilization
i	Activity or Sector
f	Factors of production: Labor and Capital

2.4.3 Closure

To ensure that the CGE has the same number of equations as the number of variables, one needs to decide which variables should be determined by the model. Variables could be internal (endogenous) or external to the model (exogenous). This selection is called the model closure. In the CGE model of the current study, the exogenous variables are:

1) Transfer payments among institutions ($ITRAN_{in,in2}$)

2) Subsidies from foreign institution ($YFROW_{f,fr}$)

3) Sectoral Subsidies (SUB_i)

4) Marginal propensity to save (MPS)

5) Exchange rate (EXR)

6) Investment (INVEST)

7) Government expenditures (GD)

8) Factor of demand (FACDEM)

9) Sectoral factor price ($WFDIST_{i,f}$)

10) Unemployment rate (UEMPR)

11) Labor supply (LSUP)

12) The rate of capacity utilization (CAPUNR)

13) Total capital stock (CSUP)

These exogenous variables are either policy variables such as transfer payment among institutions ($ITRAN_{in,in2}$), government expenditure (GD), exchange rate (EXR)or policy parameters including marginal propensity to save (MPS),

unemployment rate (UEMPR), and the rate of capacity utilization (CAPUNR). It should be noted that the selection of different exogenous variables to close the model will affect model behavior and hence simulation results.

This CGE model was written and solved using the Pathsearch-damped Newton method (PATH) solver for Mixed Complementarity Problem (MCP) of the General Algebraic Modeling System (GAMS) software. The SAM table and list of parameters were entered in Microsoft Excel using Comma Delimited (CSV) format to interact with GAMS. To simulate different counterfactual scenarios, perturbations of policy variables were introduced and the reactions of the simulated economy observed. Verification of the model will be presented in Chapter 4 with result and analysis.

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CHAPTER 3

LITERATURE REVIEW AND THE ELECTRICTY NETWORK SUBMODULE

3.1 Introduction

Interest in the energy sector has increased considerably since the first oil shock in the early 1970s (Bhattacharyya, 1996). This development has motivated many scholars and planers to create powerful tools to analyze energy policy. Among several approaches, Computable General Equilibrium (CGE) modeling was developed to investigate energy and economic interactions. This chapter reviews CGE energy research as well as the extension module and the method of integration of the module with the CGE model. The second section gives a review of electricity related CGE analysis. The third section presents applications of CGE and other types of models used in energy policy in the country of interest, Thailand. The fourth section introduces the bottom-up electricity network submodule. Next, the electricity network submodule will be integrated with the CGE model for macroeconomic and real generation analysis. The method of integration is discussed in the fifth section.

3.2 Literature Review of CGE Application to Energy Policy Related Issues

In early studies, electricity was inherently treated as an intermediate input to quantify the effect of emission control policy as illustrated in the works of Bergman (1991) and The MIT Emission Prediction and Policy Analysis (EPPA) Model as reported by Yang et al. (1996). Bergman (1991) developed a static CGE model for Sweden to simulate the impacts of factor price and resources allocation for emission gas. The model considered four types of domestic intersectorially mobile factors of

production: capital, labor, electricity and the natural resources. The Emissions Prediction and Policy Analysis (EPPA) model is a component of an integrated framework of natural and social science models being developed by the MIT Joint Program on the Science and Policy of Global Change. The EPPA recursive-dynamic model contains 12 regions and 15 production sectors of which 12 are energy related. These include crude oil, natural gas, refined oil, coal, carbon liquid backstop, carbon free electric backstop, and lastly combinations of electricity, gas and hydro. The EPPA Model examines not only the macroeconomic effects of the global emission change but also the evolution of global energy consumption.

For commodity electricity, the elasticity-based CGE model and the true technology based activity analysis model perform differently. This difference in performance occurs because CGE models, by construction, always disregard the nature of this power sector and treat its fuel feedstocks at the level of aggregation via Constant Elasticity of Substitution (CES) functions. The differences in characteristics between CGE and true (engineering) technology-based models are sometimes referred to as the top-down and bottom-up (Grubb et al., 1993). To overcome this difference, a synthesis model of bottom-up and top-down energy policy modeling called CETM was introduced by Rutherford and Montgomery (1997). The model represents an attempt to bridge the gap between (top-down) economic modeling and (bottom-up) engineering modeling to study the effects of environmental policies on the environment. In this research, a partial equilibrium model of energy sectors (ETA) was created and linked to a general equilibrium (MACRO). The process of linking these two sub-models is through passing the energy price and quantity variable

between the two-sub models and iterating until the input reference from ETA are close to the solution of MACRO.

Bohringer (1998) developed a CGE model in which the nested CES functions are employed in a top-down model to capture the substitution possibilities on the inputs side and transformation possibilities on the output side. Substitution and transformation possibilities are characterized by elasticity measures, which indicate relative changes in quantities (of inputs or outputs) due to relative changes in prices. Conversely, a bottom-up model represents a production sector utilizing a set of discrete Leontief technologies. The top-down approach then maps the continuous demand function while the bottom-up approach creates the supply curve. Bohringer (1998) also gave the example of this benchmark model in his study.

The application of energy-economy-environment-trade linkages was presented in the Global Trade Analysis Project - an energy-environment version (GTAP-E) of Burniaux and Truong (2002). This model incorporates an energy substitution feature into the standard GTAP model. The GTAP-E model was an improvement dealing with the debate about climatic change as a consequence of the implementation of the Kyoto Protocol.

The static model of Bohringer (1998) was extended by Frie et al. (2003). In this model, a dynamic formulation of bottom-up and top-down approaches was presented. In addition, the model also incorporated bottom-up activity analysis, endogenous investment decisions and specific capital stock evolutions to increase the empirical evidence of CGE-based energy policy analysis.

McFarland et al. (2004) presented a methodology for modeling low-carbon emitting technologies within the MIT Emissions Prediction and Policy Analysis (EPPA) model. The methodology translates bottom-up engineering information of two Carbon Capture and Sequestration (CCS) technologies in the electric power sector into the EPPA model and discusses issues that arise in assuring an accurate representation and realistic market penetration.

Sue Wing (2006) employed a suggestion of Bohringer (1998) and created the hybrid top-down and bottom-up model to predict the effects of carbon taxes on individual electric generation technologies using Social Accounting Matrix (SAM) for the US economy in the year 2000. The hybrid model distinguishes between 18 specific technologies, two types of coal-fired generation (steam turbines and combined-cycle), five categories of petroleum and natural gas-fired generation (internal combustion engines, combustion turbines, and gas turbines, in addition to steam turbines and combined-cycle), nuclear and hydropower, and four classes of renewable energy technologies. By comparing hybrid and standalone top-down models, the results showed that the welfare cost of emission taxes in hybrid model with a technologically rich description of the electric power sector generally exceeded those of a top-down model.

The concept of rich description of the electric power sector was expanded upon by Kuster et al. (2007). The aim of their Computable General Equilibrium/ Mathematical Programming System for General Equilibrium analysis (CGE/MPSGE) model was to evaluate energy policy measures with emphasis on employment impacts in Germany. Since the employment impact of energy decisions is dependent on the

choice of technology in power production, 13 distinct generation technologies were modeled. These technologies were captured in a bottom-up framework and aggregated by differentiating between base, middle, and peak load application prior to summing to determine the final total electricity output. The important characteristics of this model are the substitutions in the electricity sector which do not directly occur with respect to primary factors in technology production of the top-down model rather than by the structure of the electricity mix.

A technique of merging top-up and bottom-down analyses was introduced by Bohringer and Rutherford (2008). Their model formulated market equilibrium as a mixed complementarity problem which explicitly represents weak inequalities and complemetarity between decision variables and equilibrium conditions. The complementarity format then allowed an energy economy model to incorporate technological detail of a bottom-up energy system. The practicality of this technique was shown in the work of Proenca (2009). This CGE model was created to evaluate the economic impacts of the Portuguese energy policy on promoting electricity generated from renewable energy resources.

In contrast to combining two models, many approaches were proposed to overcome the drawbacks of a top-down CGE model. The following two approaches are given as examples. Bye (2008) presented a dynamic CGE model of the Norwegian economy, MSG-6, with an embedded emission module. The model specifies 60 commodities and 40 industries, classified to capture important substitution possibilities and resulting environmental implications. In addition to macroeconomic variables, the model yielded the quantity of emission as well as energy production and

consumption values in their original units. Hoefnagels et al. (2013) analyzed large scale production of bioenergy for electricity generation in Netherlands. This analysis employed a type of CGE model, the so called LEITAP model, which quantified the direct and indirect effects of bioenergy promotion policy, using a spreadsheet tool to address the technological details. The result of this study showed that by substituting biomass for fossil fuels, positive economy gains were realized as well as reduction in Green House Gases (GHGs) emissions and fossil fuel requirements.

3.3 Literature Review of CGE and Other Approaches in Energy Policy Analysis in Thailand

3.3.1 CGE approach of Energy Policy Analysis in Thailand

In Thailand, an application of CGE analysis in the study of energy policies, especially pertaining to electricity, is quite limited. The following section reviews research in electricity and other energy policies.

Watcharejyothin and Shrestha (2008) analyzed macroeconomic consequences of power trading for Thailand during the planning horizon of 2000-2035.They employing a recursive dynamic multi-sector general equilibrium model. The electricity sector was aggregated by the CES function with 9 power generation technologies. These were hydropower, steam coal, steam oil, steam gas, gas combined cycle, oil combined cycle, diesel power generation, biomass, and renewable energy. Using the SAM table of year 2000, a key finding of the study was that the substitution

of power generated in Thailand with imported power would moderately affect the gross domestic product (GDP).

Due to continuous increases in world crude oil prices, Thailand sought domestic energy resources. Among different alternatives, biofuel was one of the most attractive choices. Wianwiwat and Asafu-Adjaye (2011) developed a CGE model based on the 2005 input-output table to examine the biofuel promotion policy of Thailand. In this model, an energy composite was constructed using all energy inputs employing the CES function and Constant Ratio of Elasticities of Substitution (CRESH) technology, known as inter-fuel substitution. The results indicated that the implementation of all of the biomass-based electricity promotion policies was likely to achieve the short-run target and somewhat reduce the need to import fuels.

The primary energy sources, especially for power generation in Thailand, are fossil fuels. These create high levels of emissions and have negative environmental impacts. To analyze short-term and long-term economic implications of climatic change, Thepkhun et al. (2012) employed a top-down and bottom-up type model called AIM/CGE to study GHG mitigation measures and GHG reduction targets under emission trading policies. The model, developed by the Asia-Pacific Integrated Model (AIM) team, used an input-output table and energy balance table for the base year of 2005. The results presented the economic effects of climatic change with respect to different input fuel compositions for electricity generation.

Timilsina and Shrestha (2008) employed a CGE model to investigate the effects of Demand Side Management (DSM) programs on the Thai economy. The DSM program relied on replacement of older household electrical appliances with

newer energy-efficient ones. The research concluded that the impacts of a DSM program relied on three important factors. These were (1) the ratio of unit cost of electricity savings to price of electricity (CPR), (2) implementation of the DSM strategy, and, (3) scale or size of the DSM option.

Another relative simple method was also applied in an analysis of power policy recommendations. Limmeechokchai and Suksuntornsiri (2007) proposed a decomposition of input-output analysis to examine the fuel-mix effect, input structural effect, and final demand effect of changing power generation technology. The aim of their research was to assess cleaner electricity generation technologies for net emission mitigation. The cleaner technologies included biomass power generation, hydroelectricity and integrated gasification combined cycle (IGCC).Their results show that renewable technology presented a better migration option for replacement of conventional pulverized coal technology than clean coal technology.

3.3.2 Other Approaches to Energy Policy Analysis in Thailand

Electricity shortages have long been a serious concern to Thailand. Many local researchers recognized the seriousness of this issue and conducted important studies using methodologies other than CGE analysis. This section presents selected work on electricity policy and planning which can be broadly classified into three major categories. These are (1) electricity generation, supply, and expansion, (2) energy security, and (3) forecast of demand for electricity. The first type of electricity research involves the portfolio of generation and capacity expansion. Dealing with true electricity generation, this research type could be classified in the bottom-up

category. In terms of numbers, this research type is more voluminous than the other two because the country's top priorities are reliability of power supply and expansion, fuel diversification, and accessibility (Chirarattananon and Nirukkanaporn, 2006). The concept of improving existing generation was introduced by Gvozdenac et al. (2006). This study focused on the concept of gas-based high efficiency cogeneration of heat and power to the industrial and commerce sectors. It was followed by the analysis of Mulugetta et al. (2007) dealing with power sector scenarios for Thailand in the 2002 to 2022 range. The study projected that fossil fuel will dominate power generation and an increasing fuel imports are likely.

Nakawiro et al. (2008) assessed the economic impact of gas dependence in power generation using the Wien Automatic System Planning Version IV (WASP-IV) package developed by the International Atomic Energy Agency (IAEA). The results predicted that from 2011 to 2025 the average cost of natural gas for power generation will account for 2.41% of the country's GDP while high oil prices in international energy markets will push this cost to 2.97% of GDP. Chaivongvilan and Sharma (2010) examined the long-term impacts of different alternative energy policies by employing a linear optimization approach. Their results showed that the implementation of nuclear power and renewable energy is unlikely to ease the country's dependency on energy imports.

Wangjiraniran and Euaarporn (2010) studied the impacts of using gas, coal, and nuclear energy in power generation on generation costs, emissions and resource availability. The research concluded that for the coal option, the benefit of cost reduction would be diminished at carbon prices above 40 USD/ton. Additionally, it

suggested that the country needs fuel diversification because of natural gas depletion. This result is in agreement with that of Vithayasrichareon and MacGill (2012) which highlighted that carbon pricing could significantly influence the appropriateness of different future generation portfolios.

Sritong et al. (2012) presented the potential of renewable power generation in Thailand for CO_2 mitigation under the framework of Nationally Appropriate Mitigation Actions (NAMAs). By employing an AIM/Enduse model of the National Institute for Environmental Studies (NIES), their results predicted significant CO_2 reduction under NAMA. They further suggested that power generation needs strong efforts from Thai government and international support to achieve the goals of its climatic change mitigation program.

Keyuraphan et al. (2012) further studied renewable energy subsidy promotion and supported two major policies. These were downgrading of the Feed-in Tariff (FIT) and the Renewable Portfolio Standard (RPS). The FIT policy provides a long-term, fixed price payment to the renewable energy generator while the RPS, applied to existing power producers, has a mandatory supply electricity from renewable resources either by self-production or by outside purchase.

Watcharejyothin (2007) analyzed the effects of hydroelectric power trade between the Lao PDR and Thailand on economic impacts, energy resource mix, electricity generation capacity mix in both countries. Using the Market Allocation (MARKAL) model, a bottom-up type of least-cost linear optimization, the study showed that power purchased from Laos is necessary to fulfill the projected demand of Thailand. In addition, the results predicted that purchased power from Laos could

strongly reduce the use of imported coal in Thailand. Vithayasrichareon and MacGill (2013) developed a probabilistic portfolio analysis tool to assess generation portfolios with wind power. Their outcome suggested that wind generation would increase overall portfolio costs but reduce cost risks and emissions. The analysis further showed that the value of wind power depends on carbon price and technology mix.

On the second factor, electricity security, Nakaviro and Bhattachryya (2007) analyzed the effects of natural gas dependence on the security of the electricity supply. Using the average elasticity of electricity tariffs relative to fuel oil prices and to gas prices, they found out that for every 10% change in natural gas price, electricity tariff in Thailand would change by 3.5%. Furthermore, the volatility of gas prices is the main factor behind vulnerability concerns. Cabalu (2010) evaluated a set of gas supply security indicators. These included gas intensity, net gas import dependency, and the ratio of domestic gas production to total domestic gas consumption and geopolitical risks of seven gas-importing countries (China, Japan, Taiwan, India, Thailand, Singapore, and Korea) in Asia for the year 2008. The author found that Thailand is ranked as having the third largest net gas import dependency after China and India. Thailand's energy security was reevaluated by Martchamadol and Kumar (2012) examining nineteen indicators. The results indicated that the Low Carbon Society (LCS) scenario showed the lowest vulnerability to energy risk over a long term. It predicted a 60% primary energy intensity reduction compared to the year 2009 level.

Lastly, electricity demand forecasting in Thailand is a critical function that has long been done by the government authorities and scholars. Load forecast research is primarily conducted using either time series or panel data through econometrics

methods at various level of consumption. On a national level, Energy Policy and Planning Office (EPPO) is the government agency responsible for this task. EPPO commissioned the National Institute of Development Administration (NIDA) to conduct research forecasting electricity consumption and peak power requirements in Electricity Generating Authority of Thailand EGAT, Metropolitan Electricity Authority (MEA), and Provincial Electricity Authority (PEA) systems. Using NIDA models, Lorchirachoonkulet al. (2006) predicted consumption of electricity (GWh) using 3 dependent variables. These were gross domestic product (millions of Baht), average power tariff by month (Baht/kWh), and temperature (degrees Celsius). On the sectoral level, Buranakunaporn and Oczkowski (2007) created a dynamic econometric model to estimate energy demand in the manufacturing sector while Teetong (2012) developed an Error Correction Model (ECM) and cointegration model to examine electricity consumption in residential, commercial, industrial, and governmental sectors.

3.4 Thailand Electricity Submodule

After reviewing the literature in electricity, it was found that there were 3 important elements missing. These are (1) the linkage between the electricity supply system and macroeconomic perspective, (2) the provision for transition mechanisms from the micro to macro point of view, and, (3) failure to include the electrical transmission system in analyses. The current research was conducted to bridge the gaps caused by this missing information. The structure of the electricity network

module is presented in this section followed by the method of integration of this submodule into the CGE model.

The present electricity module employs a linear optimization bottom-up type methodology aiming to minimize the total costs incurred from power production activities using information from published literature (Anderson (1972); Hobbs (1995); Meza et al. (2007)). The objective cost function of this model comprises four major components: costs of fuel, varied costs of operation and maintenance of the power plants, transmission costs, and power outage costs. The constraints are set to avoid violation of the existing power infrastructures and their actual capacities. The following section gives detailed information of the model's input data, decision variables and the model formulation.

3.4.1 Input Data

The input data consist of the number and capacity of power plants, fuel costs per unit of power generation, transmission limitations and transmission costs in the existing distribution network, outage costs per unit of unmet demand at each node, and consumption of power at each location. The data were acquired electronically from the power producers' and government agencies' webpages (EPPO, EGAT, MEA, PEA). Related parameters of the electricity supply industry were obtained from existing studies of Thai energy research institutions, published literature, and the author's estimates. All inputs were converted into monetary units to establish the cost function and perform the calculations subject to a set of location and supply capability constraints.

3.4.1.1 Power Supply Information

From total power resources listed in Thailand Power Development Plan (EGAT, 2007), the current study examines 44 power resources having individual supply capacities of more than 5 MW and using one of seven types of utilization fuels. These fuels were domestic natural gas, imported natural gas, domestic coal, imported coal, fuel oil, hydro- and imported electricity.

Among various fuel types, natural gas was the most important resource for electricity generation. The electricity output of all 19 grids accounted for approximately 85 % of the entire national power supply (EGAT, 2007). Twelve grids are dispersed in the central, west, and southeast regions of the country. Six larger grids, Gulf Power Generation, Bang Pakong, Glow IPP, BLCP Power, Rayong, and Independent Power Producer (Thailand), accounted for roughly 31% of the total capacity. They are geographically clustered in the eastern region of the country. This is where the natural gas pipelines from the Gulf of Thailand come ashore in Rayong Province. These grids serve manufacturing intensive businesses of the region. The Westside, Rajchaburipower, Rajchburithermal and Trienergy power plants contribute approximately 18% of total power supply. They rely on natural gas imported through the western pipeline from the Yadana and Yadagun fields of Myanmar in the Bay of Bengal. The power plants examined in this study are presented in Table 3.1.

Table 3.1: Considered Power Plants in the Study

No.	Power plant	Symbol	Region	Technology**	Fuel	Capacity (MW)
1	Mae Moh	SN1	North	Thermal	Domestic Coal	2180
2	Bhumibol dam	SN2	North	Hydro	Water	743.8

Table 3.1: Considered Power Plants in the Study (Continued)

3	Sirikit dam	SN3	North	Hydro	Water	500
4	Nam Phong 2	SN4	Northeast	CC.	Domestic gas	650
5	Ubolratana dam	SN5	Northeast	Hydro	Water	25.2
6	Lam Takhong dam	SN6	Northeast	Hydro	Water	500
7	Chulabhorn dam	SN7	Northeast	Hydro	Water	40
8	Nam Pung dam	SN8	Northeast	Hydro	Water	6
9	Pak Mun dam	SN9	Northeast	Hydro	Water	136
10	Sirindhorn dam	SN10	Northeast	Hydro	Water	36
11	LanKrabeau	SN11	North	GT.	Domestic gas	220
12	Kaeng Koi 2	SN12	Northeast	GT.	Domestic gas	1,468
13	Wang Noi	SN13	Central	CC.	Domestic gas	1,910
14	National Power Supply	SN14	East	Thermal	Imported coal	540
15	Siam Energy	SN15	East	CC.	Domestic gas	1,468
16	Bang Pakong	SN16	East	Thermal	Domestic gas	2,832
17	Phan Thong	SN17	East	CC.	Domestic gas & Diesel	713
18	Kiridharn dam	SN18	East	Hydro	Water	12.8
19	BLCP	SN19	East	Thermal	Imported coal	1,346.5
20	Rayong	SN20	East	CC.	Domestic gas	1,175
21	IPP Dependent	SN21	East	CC.	Domestic gas	700
22	Bang Bo	SN22	East	CC.	Domestic gas	350
23	South Bangkok	SN23	East	CC.	Domestic gas &Fuel oil	1,437
24	NongJok	SN24	East	GT.	Diesel	351
25	Ratchaburi Power	SN25	West	CC.	Imported gas	1,400
26	Ratchaburi Thermal	SN26	West	CC.	Imported gas	3,481
27	Srinagarin dam	SN27	West	Hydro	Water	720
28	Vajiralongkorn dam	SN28	West	Hydro	Water	300
29	ThaThung Na dam	SN29	West	Hydro	Water	38
30	Tri Energy	SN30	West	CC.	Imported gas	700
31	KaengKrachan dam	SN31	West	Hydro	Water	19
32	Rajjaprabha dam	SN32	South	Hydro	Water	240
33	Khanom	SN33	South	Thermal	Domestic gas &Fuel oil	818
34	Krabi	SN34	South	Thermal	Fuel oil	315
35	Chana	SN35	South	CC.	Domestic gas	710
36	Bang Lang dam	SN36	South	Hydro	Water	71
37	Suratthani	SN37	South	GT.	Diesel	234
38	TheunHinboun dam	SN38	Lao	Hydro	Imported electricity	214
39	HouayHoa dam	SN39	Lao	Hydro	Imported power	126
40	Nam Ngum dam	SN40	Lao	Hydro	Imported power	150
41	Nam Leuk dam	SN41	Lao	Hydro	Imported power	60
42	Malaysia	SN42	Malaysia	n/a	Imported power	300
43	North Bangkok	SN43	Central	CC.	Domestic gas	700
44	Nam Theun dam	SN44	Lao	Hydro	Imported power	1,008

Source:EGAT, 2007

**Technology: GT-Gas Turbine, CC-Combined Cycle

Table 3.2: Power Plants Parameters

No.	Plant fuel	Symbol	Plant Efficiency*	Heat Content**	Fuel cost*
1	Domestic gas	GD	0.28	1,000 BTU/SCF	0.16 Baht/SCF
2	Imported gas	GI	0.44	1,000 BTU/SCF	0.16 Baht/SCF
3	Domestic coal	CD	0.12	26,600 BTU/kg	1,000 Baht/ton
4	Imported coal	CI	0.19	10,714 BTU/kg	1,000 Baht/ton
5	Hydro	H	0.4	n/a	n/a
6	Diesel	D	0.34	36,310 BTU/l	13.50 Baht/l
7	Fuel oil	O	0.11	38,889 BTU/l	12 Baht/l
8.1	Imported electricity from Laos	E	n/a	n/a	2,300 Baht/MWh***
8.2	Imported electricity from Malaysia	E	n/a	n/a	2,275 Baht/MWh***

*Based on author's estimation
**Base on the study of Nakawiro et al. (2008)
***Price for electricity import
Noted that BTU-British Thermal Unit, SCF-Standard Cubic Feet, kg-Kilogram, l-Liter

The plant parameters used in this model are given in Table 3.2. Plant Efficiency (PE) is the ratio of actual electricity output (MWh/year) divided by energy input (MWh/year). The Operating Factor (OF) is the duration of a plant's actual service (hours) divided by considered period (hours) while the Capacity Factor (CF) is the actual electricity produced (MW) divided by the maximum possible energy (MW) that might have produced during the same period.

3.4.1.2 Demand for Electricity

There are13 nodes on the demand side. They consist of 12 PEA regional offices and 1 MEA metropolitan office. They were selected to reference the aggregated demand sites during a peak day in April, which is the hottest month of the year, to calibrate daily national power consumption. The quantities of daily required power in Megawatt-hours (MWh) at each place are determined from the load duration

curves. These were retrieved from historical power consumption values of 2010 and then extrapolated into annual consumption.

The raw data giving monthly electricity consumption in MW are published on MEA and PEA websites. The original records are classified by 8 types of consumers. These are small residential(less than 150 unit/month), residential (more than150 unit/month), small businesses, medium-sized businesses, large businesses, specific businesses, government offices, and agriculture. These data were collected at quarter of an hour intervals. In order to obtain the load profile, power used by all consumers was aggregated and rearranged in descending order. The load curve was then plotted using power consumed in Megawatts (MW) as the domain on the vertical axis and binned number of hours on the horizontal axis. The horizontal axis is grouped into 3 periods. The first 6 hours (t_1) represents the peak load, the subsequent 12 hours (t_2) represents moderate load, and the remaining 6 hours (t_3) denotes the base load. The area below the curve therefore becomes the energy consumed over a particular time period (MWh). In this study, the approximation of demand (MWh) was obtained by multiplying number of hours with the maximum MW usage in each period. A summary table of demand and outage costs is given below as Table 3.3 and Table 3.4.

Table 3.3: The Estimated Outage Cost

No.	Demand node	Region	Location (Province)	Outage cost
1	DN1	North	Chaing Mai	73,281
2	DN2	North	Phitsanulok	64,991
3	DN3	North	Lopburi	71,450
4	DNE1	Northeast	UdonThani	76,702
5	DNE2	Northeast	UbonRatchathani	75,582
6	DNE3	Northeast	NakornRatchasrima	83,690
7	DC1	Central	Ayuthdaya	61,396
8	DC2	Central	Chonburi	64,256

Table 3.3: The Estimated Outage Cost (Continued)

9	DC3	Central	NakornPrathom	75,498
10	DMEA	Bangkok metropolitan	Bangkok	53,799
11	DS1	South	Patchaburi	55,138
12	DS2	South	Nakhonsithammarat	54,142
13	DS3	South	Yala	59,450

Source: Energy Research Institute, Chulalongkorn University (2001)

Table 3.4: The Estimate Electricity Demand

No.	Demand node	Peak load (MWh)	Intermediate load (MWh)	Base load (MWh)
1	DN1	2,601	4,759	1,629
2	DN2	2,845	4,992	1,793
3	DN3	3,759	6,890	2,840
4	DNE1	3,710	6,479	2,513
5	DNE2	3,287	5,022	1,973
6	DNE3	4,696	8,480	3,039
7	DC1	9,857	18,879	8,416
8	DC2	27,894	46,960	14,667
9	DC3	10,389	19,462	5,358
10	DMEA	31,685	41,700	27,300
11	DS1	4,125	7,943	3,238
12	DS2	4,474	8,097	3,420
13	DS3	3,759	6,890	2,840

Source: Provincial Electricity Authority (PEA) and Metropolitan Electricity Authority (MEA) websites

3.4.1.3 Distribution Network

The transmission network represents the flow of electricity from its generation points to the referenced demand locations. Information about the transmission network supply/source and demand/sink nodes was obtained from the PDP report (EGAT, 2007). The original network diagram is simplified and presented in Figures 3.1. All nodes are renamed and presented in Figure 3.2. As shown in the network diagram, there are 10 transshipment nodes in the Northern region {TN1,....TN10}, 16 transshipment nodes in the Northeast region {TNE1,...TNE16}, 21 transshipment nodes in the Central region {TC1,.....TC10, TC14,TC17, TC18, TC19, TC23,

...,TC29}, and 8 transshipment nodes in the Southern region {TS1,....,TS8}. The transshipment nodes are connected by 4 different types of power lines, i.e., 69kV, 115kV, 230kV, and 500kV.

Using this linkage, the current model has 5 types of transmission paths connecting any two points. These are

1) From a power plant to a transmission node (Z_1)

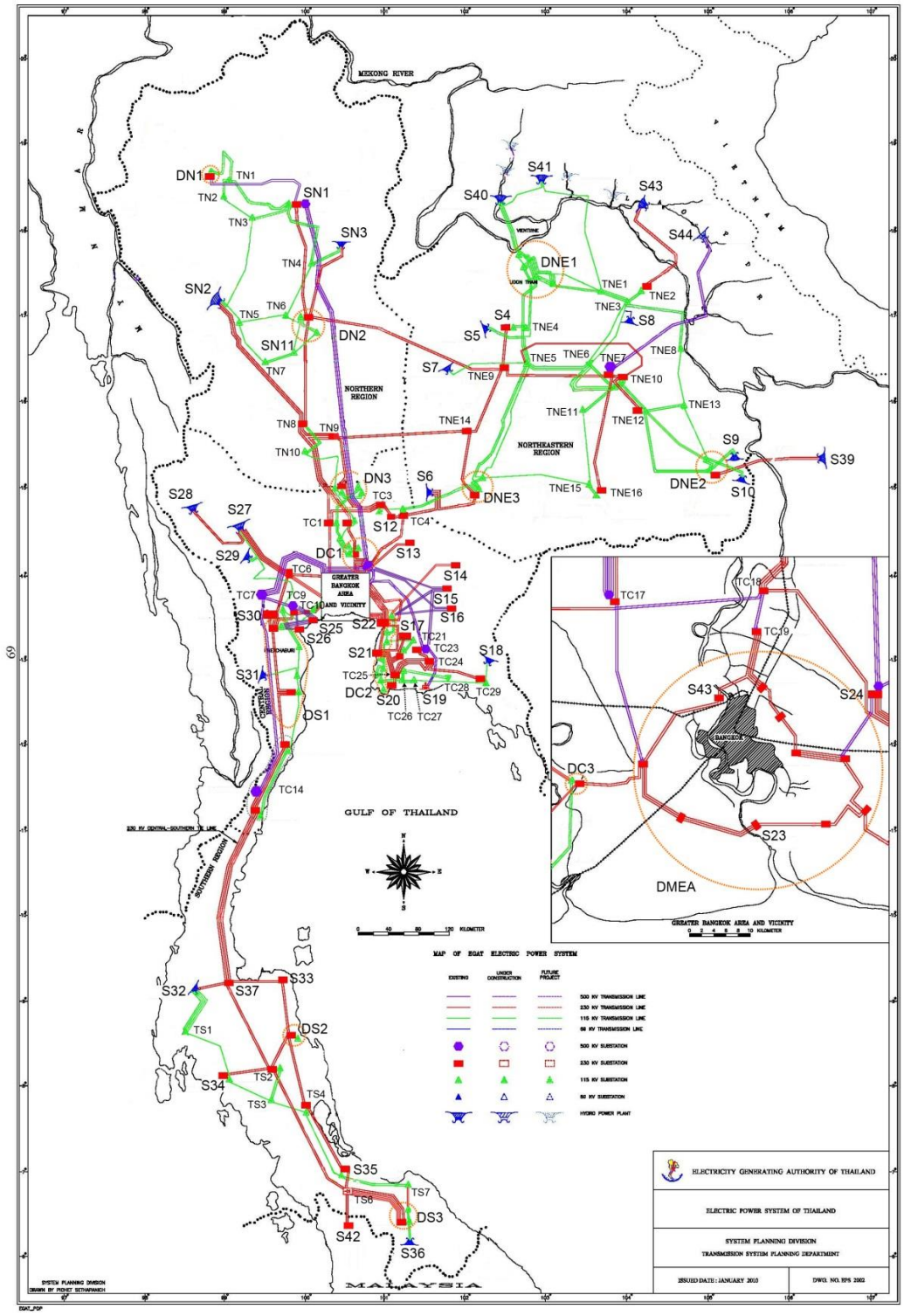
2) From transmission to transmission node (Z_2)

3) From transmission node to demand node (Z_3)

4) From power plant to demand node (Z_4)

5) From demand node to demand node (Z_5)

These connection types are shown in Figure 3.1.Detailed information about connections and capacities is given in Tables 3.5-3.9.



Source: EGAT (2007)

Figure 3.1: A Simplified Electric Network of Thailand with Power Plants

Table 3.5: A List of Connections from Power Plants to Transmission Nodes (Z_1) and Capacities

No.	Linkage	Number of lines x Capacity (MW)	Total Capacity constraints (MW)
1	SN1.TN1	2x140	280
2	SN1.TN3	1x140	140
3	SN1.TN4	2x140	280
4	SN2.TN3	1x140	140
5	SN2.TN5	1x140	140
6	SN2.TN8	3x1250	3750
7	SN3.TN4	2x140	280
8	SN11.TN7	2x140	280
9	S4.TNE4	2x140	280
10	S4.TNE9	2x400	800
11	S5.TNE4	1x140	140
12	S5.TNE5	1x140	140
13	S7.TNE5	1x140	140
14	S8.TNE3	1x50	50
15	S6.TC4	2x400	800
16	S12.TC3	2x400	800
17	S12.TC4	2x400	800
18	S15.TC23	2x1,250	2500
19	S18.TC29	1x140	140
20	S19.TC23	2x1,250	2500
21	S20.TC25	4x400	1600
22	S24.TC23	1x1,250	1250
23	S25.TC9	4x1,250	5000
24	S26.TC9	2x1,250	2500
25	S27.TC6	4x400	1600
26	S28.TC6	1x400	400
27	S29.TC6	1x140	140
28	S29.TC8	1x140	140
29	S32.TS1	4x140	560
30	S34.TS1	1x140	140
31	S34.TS2	2x400	800
32	S34.TS3	1x140	140
33	S35.TS5	6x400	2400
34	S35.TS6	2x400	800
35	S37.TS8	2x400	800
36	S32.TS8	2x400	800
37	S33.TS8	2x400	800
38	S38.TNE2	2x400	800
39	S41.TNE1	1x140	140
40	S42.TS6	2x400	800
41	S44.TNE7	2x1,250	2500

Source: EGAT (2007)

Table 3.6: A List of Connections from Transmission Nodes to Transmission Nodes (Z_2) and Capacities

No.	Linkage	Number of lines x Capacity (MW)	Capacity constraints (MW)
1	TN2.TN1	2x140	280
2	TN3.TN2	1x140	140
3	TN4.TN6	1x140	140
4	TN5.TN6	1x140	140
5	TN5.TN7	1x140	140
6	TN8.TN9	2x400	800
7	TN8.TN10	2x140	280
8	TN8.TC1	2x400	800
9	TNE14.TN9	2x400	800
10	TN8.TC2	1x140	140
11	TNE2.TNE3	2x140	280
12	TNE3.TNE1	3x140	420
13	TNE3.TNE6	2x140	280
14	TNE3.TNE8	2x140	280
15	TNE5.TNE6	2x140	280
16	TNE5.TNE10	2x140	280
17	TNE6.TNE10	3 x140	420
18	TNE7.TNE10	2x400	800
19	TNE7.TNE16	2x400	800
20	TNE8.TNE13	1x140	140
21	TNE9.TNE7	2x400	800
22	TNE9.TNE10	1x400	400
23	TNE9.TNE14	2x400	800
24	TNE10.TNE11	2x140	280
25	TNE10.TNE12	2x140+2x400	1080
26	TNE11.TNE15	2x140	280
27	TNE12.TNE13	2x140	280
28	TNE16.TNE15	2x140	280
29	TC1.TC17	2x400	800
30	TC3.TC1	2x400	800
31	TN9.TC2	2x400	800
32	TC3.TC4	2x140	280
33	TC6.TC17	2x400	800
34	TC14.TC7	2x1,250	2500
35	TC7.TC9	2x1,250	2500
36	TC7.TC17	3x1,250	3750
37	TC8.TC10	1x140	140
38	TC9.TC10	4x400	1600
39	TC17.TC18	2x1,250	2500
40	TC18.TC19	2x1,250	2500
41	TC23.TC24	2x400	800
42	TC24.TC25	4x400	1600
43	TC24.TC29	2x400	800
44	TC26.TC25	2x140	280
45	TC27.TC26	2x140	280
46	TC28.TC25	2x140	280

Table 3.6: A List of Connections from Transmission Nodes to Transmission Nodes (Z_2) and Capacities (Continued)

47	TC28.TC27	1x140	140
48	TC29.TC28	1x140	140
49	TS1.TS2	1x140	140
50	TS2.TS3	2x140	280
51	TS2.TS6	2x400	800
52	TS3.TS4	1x140	140
53	TS4.TS5	1x140 + 2x400	940
54	TS5.TS6	2x400	800
55	TS5.TS7	2x140	280
56	TS8.TS2	2x400	800
57	TS8.TC14	4x400	800

Source: EGAT (2007)

Table 3.7: A List of Connections from Transmission to Demand Nodes (Z_3) and Capacities

No.	Linkage	Number of lines x Capacity (MW)	Capacity constraints (MW)
1	TN1.DN1	2x280	280
2	TN6.DN2	1x140	140
3	TN7.DN2	1x140	140
4	TN8.DN2	2x400	800
5	TNE9.DN2	2x400	800
6	TN9.DN3	2x400	800
7	TN10.DN3	1x140	140
8	TC1.DN3	2x280	280
9	TC2.DN3	1x140	140
10	TC3.DN3	2x140	800
11	TNE1.DNE1	3x140	420
12	TNE4.DNE1	2x140	280
13	TNE5.DNE1	2x140	280
14	TNE12.DNE2	5x140	700
15	TNE13.DNE2	1x140	140
16	TNE5.DNE3	3x140	420
17	TNE14.DNE3	2x400	800
18	TNE15.DNE3	1x140	140
19	TC4.DNE3	2x140	280
20	TC1.DC1	2x140	280
21	TC2.DC1	1x140+2x400	940
22	TC4.DC1	1x400	400
23	TC7.DC1	1x1,250	1250
24	TC17.DC1	3x1,250	3750
25	TC23.DC1	1x1,250	1250
26	TC18.DC2	2x400	800
27	TC25.DC2	4x400	1600
28	TC26.DC2	2x140	280
29	TC6.DC3	3x400	1200
30	TC10.DC3	2x140+4x400	1880

Table 3.7: A List of Connections from Transmission to Demand Nodes (Z_3) and Capacities (Continued)

31	TC17.DMEA	2x1250	2500
32	TC19.DMEA	4x400	1600
33	TC6.DS1	2x400	800
34	TC8.DS1	2x140	280
35	TC9.DS1	2x400	800
36	TC14.DS1	2x140 +2x400	1080
37	TS2.DS2	2x400	800
38	TS4.DS2	2x400	800
39	TS6.DS3	6x400	2400
40	TS7.DS3	2x400	800

Source: EGAT (2007)

Table 3.8: A List of Connections from Power Plants to Demand Nodes (Z_4) and Capacities

No.	Linkage	Number of lines x Capacity (MW)	Capacity constraints (MW)
1	SN1.DN1	2x1,250	2500
2	SN3.DN2	2x400	800
3	SN11.DN2	2x140	280
4	S40.DNE1	4x140	560
5	S9.DNE2	2x140	280
6	S10.DNE2	2x140	280
7	S39.DNE2	2x400	800
8	S6.DNE3	2x400	800
9	SN1.DC1	3x1,250	3750
10	S13.DC1	2x400	800
11	S15.DC1	2x1,250	2500
12	S16.DC1	2x1,250	2500
13	S24.DC1	4x1,250	5000
14	S14.DC2	2x400	800
15	S15.DC2	2x1,250	2500
16	S16.DC2	2x1,250	2500
17	S17.DC2	2x400	800
18	S21.DC2	2x400	800
19	S24.DC2	4x400	1600
20	S22.DMEA	2x400	800
21	S23.DMEA	6x400	2400
22	S24.DMEA	2x1,250	2500
23	S43.DMEA	2x1,250	2500
24	S25.DS1	4x1,250	5000
25	S26.DS1	2x1,250	2500
26	S30.DS1	2x400	800
27	S31.DS1	1x140	140
28	S33.DS2	2x400	800
29	S36.DS3	2x140	280

Source: EGAT (2007)

Table 3.9: A List of Connections from Demand to Demand Nodes (Z_5) and Capacities

No.	Linkage	Number of lines x Capacity (MW)	Capacity constraints (MW)
1	DC2.DMEA	2x400	800
2	DC3.DMEA	2x400	800

Source: EGAT (2007)

3.4.2 Decision Variables

The model contains 5 groups of decision variables. They are total cost (CS), quantity of electricity generated (Y), fuel consumption (X), flow of electrical current (Z), and unmet demand of each location (U). The nomenclature of the decision variables is provided in Table 3.10

Table 3.10: Submodule Decision Variable Nomenclature

Variable	Nomenclature
CS	Total cost that incurred from generation and transmission activities (Billions of Thai Baht)
$Y_{i,j,t}$	Quantity of electricity generated from plant *i* by fuel *j* at period t (MWh)
$X_{i,j,t}$	Fuel consumption in plant *i* by fuel *j* at period t (Original volume unit)
$Z1_{i,n,t}$	Electricity flow from power plants *i* to transmission node *n* at time *t* (MWh)
$Z2_{n,m,t}$	Electricity flow from transmission node *n* to *m* at time *t* (MWh)
$Z3_{n,k,t}$	Electricity flow from transmission node *n* to demand node *k* at time *t* (MWh)
$Z4_{i,k,t}$	Electricity flow from power plant *i* to demand nodes *k* at time *t* (MWh)
$Z5_{k,kn,t}$	Electricity flow from demand node *k* to demand nodes *kn* at time *t* (MWh)
$U_{k,t}$	Unmet demand or shortage of electricity supply at demand node *k* at time *t* (MWh)
i	Index of 44 plants
j	Fuel {Domestic gas, ..., Imported electricity}
n/m	Transmission nodes {TN_1,.....,TS_8}
k/kn	Demand nodes {DN1, DN2,....,DS3}
t	Time{t_1, t_2, t_3}

3.4.3 Model Formulation

This present model consists of an objective function and a set of constraints. The objective function in this study has 4 components. These are (1) cost of fuel, (2) variable costs of operation and maintenance of each power plant, (3) transmission costs, and, (4) power outage costs.

The first component, fuel cost (f_1), is the total costs of fuel feedstocks of all power plants in the current study. These costs are expressed by summation of the product of the cost per unit of fuel feedstock and the quantity of fuel used over a particular time period.

$$f_1 = \sum_i \sum_j \sum_t (p_j . X_{i,j,t})$$

where

$$X_{i,j,t} = \frac{Y_{i,j,t}}{\eta . HC_j}$$

$X_{i,j,t}$ is fuel consumption of plant *i* using fuel j during period t (volume unit). $Y_{i,j,t}$ is quantity of electricity generated by plant *i* using fuel j over time period t (MWh) and HC_j is the heat content of fuel j. For the parameters, p_j is the price of fuel type *j* (Baht/Volume unit) and η is the plant efficiency provided in Table 3.2.

The second component cost is the Variable Operation and Maintenance (VOM) cost (f_2). Since the model considers only existing power grids, fixed costs such as the costs of power plant construction, properties, and equipment are neglected. The VOM cost is summation of the product of the quantity of generated power, the variable operation cost and maintenance factor vom_j. In this study, the vom_j was fixed at 90 Baht/MWh for all types of power plants.

$$f_2 = \sum_i \sum_j \sum_t (Y_{i,j,t}.vom_j)$$

A transmission cost (f_3), the third cost element, is the cost of electricity transmission through the power grid to the regional PEA and MEA distribution centers. The marginal capacity charge is based on the Long Run Average Incremental Cost (LRIAC) and the transmission loss charge is based on the average loss in the transmission system. These terms are combined into the Transmission Usage of System charge (TUOS) paid by consumers (Limpasuwan et al., 2004). The transmission charge is obtained from the product of the electrical current flow in each transmission line and the estimated TUOS cost.

$$f_3 = \sum_i \sum_n \sum_t (Z1_{i,n,t}.tuos_1) + \sum_n \sum_m \sum_t (Z2_{n,m,t}.tuos_2) + \sum_n \sum_k \sum_t (Z3_{n,k,t}.tuos_3) + \sum_i \sum_k \sum_t (Z4_{i,k,t}.tuos_4) + \sum_k \sum_{kn} \sum_t (Z5_{k,kn,t}.tuos_5)$$

The parameter, *tuos*, is the transmission usage of system charge of the transmission per unit of electricity (Baht/MWh) based on connection type {Z1,...., Z5}. In this study, *tuos1* through *tous5*are estimated to be 8, 7, 6, 5, and 9 Baht/MWh, respectively.

The last term, Outage costs (f_4), represents the blackout cost when the power supply insufficiently serves demand at any location. Although the average outage duration and frequency has been greatly reduced, natural gas shortages in Myanmar still occur and lead to temporary reduced power production. The outage cost is the product of unmet power demand and the Interruption Energy assessment Rate (IER). Table 3.3 provides outage costs (*otc*) at location (*k*),

$$f_4 = \sum_k \sum_t otc_k U_{k,t}$$

Generation and transmission constraints are comprised of 7 different types. They are:

1) The capacity limit of each plant. Productivity of power grids is dependent upon their technologies and fuel types. The power output of a plant cannot exceed its maximum plant capacity at any time.

2) The capacity of fuel supply. The quantity of fuel supplied is regarded as the most critical element. As indicated, the majority of electricity supplied is generated from natural gas. The gas supply has to be properly allocated among power plants using this fuel and a reserve supply maintained without surpassing the reserve ceiling level.

3) Transmission capacity of each transmission line. According to EGAT, there are four types of transmission line used in the distribution system. Their capacities are 69kV, 115kV, 230kV, and 500kV. They can carry and 75-25MW, 100-200MW, 300-500MW, and 1000-1500MW respectively. To incorporate this information into the model, transmission limits are set by determining the average capacity in each dispatch line multiplied by number of hours in the time period of interest. Transmission limitations are shown in Tables 3.5-3.9.

4) Balance at supply nodes. This set of constraints represents the conservation of power at the source nodes. Such constraints consider that electricity generated at every power station equals the transmitted electricity through available electric lines at any time period.

5) Balance at transshipment nodes. This set of constraints ensures the preservation of inlet current and outlet current through the power substations and transshipment nodes.

6) Balance at demand nodes: Power inflow and load requirement must be identical. The flow balance is expressed as the power supply from transmission lines plus unmet demand ($U_{k,t}$) being equal to power demand at sink nodes ($D_{k,t}$) over any time period, *t*.

7) Nonnegativity. All decision variables except $Z5_{k,kn,t}$ must hold positive values.

$$X_{i,j,t}, Y_{i,j,t}, Z1_{i,n,t}, Z2_{n,m,t}, Z3_{n,k,t}, Z4_{i,k,t}, U_{kt} \geq 0$$

The model can be written as follows:

$$Min \left\{ f_1 + f_2 + f_3 + f_4 \right\}$$

s.t. constrains

3.5 The Method of Integrating CGE and Electricity Network Submodules

The integration method in the current study follows a decomposition strategy (Rutherford and Böhringer, 2006). The solution involves iteration of a top-down CGE model given the demand of fuel for electricity generation from a bottom-up model. Figure 3.3 illustrates the steps of this iterative model solution.

To combine bottom-up modeling and top-down CGE, the objective function of the bottom-up model was changed to maximizing profit of the electricity sector rather than minimizing cost of electricity activities. This is compliment to the cost minimization problem.

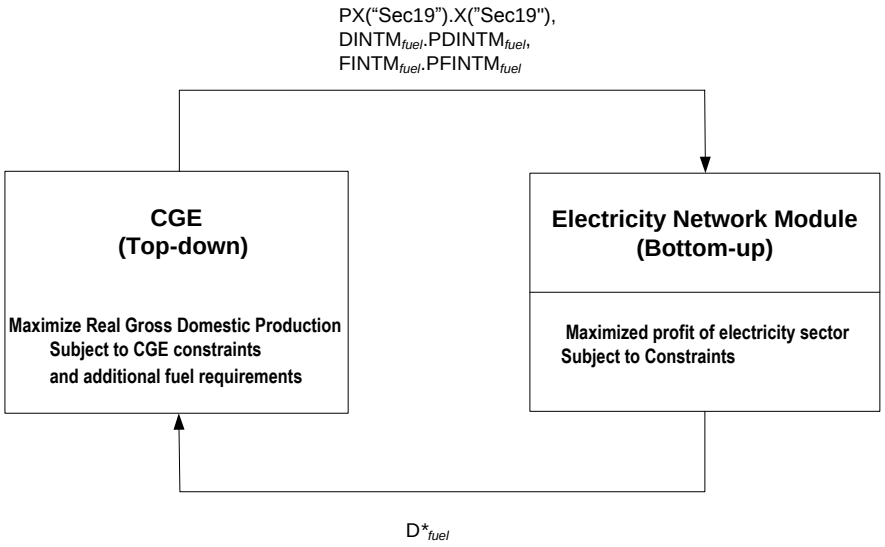


Figure 3.2: The Integration Scheme of Top-down and Bottom-up Models

The solution procedure starts from the bottom-up network model calculating the demand for 7 different fuels (D^*). These are domestic natural gas, imported natural gas, domestic coal, imported coal, fuel oil, hydro- and imported electricity. The solution then is calibrated and fed into the general equilibrium model as the import and domestic intermediate inputs. The CGE next proceeds to determine the price (PX("SEC19")) and quantity (X("SEC19") of electricity sectors and other macroeconomic variables. Then, price and quantity of electricity sectors are brought back to the bottom-up model to solve the profit maximization problem of the electricity sector. This is the compliment of the cost minimization problem. In addition, fuel as total domestic and total imported intermediates inputs ($DINTM_{fuel}.PDINTM_{fuel}$ and $FINTM_{fuel}.PFINTM_{fuel}$) is determined from the CGE model for electricity production and passed along to the submodule as fuel supply constraints, The aggregation continues recursively until two models reach equilibrium.

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CHAPTER 4

THE SIMULATION RESULTS AND ANALYSIS OF SELECTED CASE STUDIES

4.1 Introduction

This chapter presents the simulation results of three case studies of interest: (1) imported natural gas disruption, (2) different input compositions for electricity generation, and (3) the increases in investment and local demand of electricity, by utilizing the integrated top-down and bottom-up model presented in Chapter 3. The analysis of each case study is shown and their applications to the policy makers and planners discussed. The second section provides the baseline discussion followed by the results of simulation cases in the third section.

4.2 Baseline Simulation

Like other research methods, the primary attempt of this current study is to replicate economic conditions and electricity generating configuration of Thailand prior to perturbing the model and observing the responses. Therefore it is necessary to compare the real economic historical data with the baseline result produced from the model. Due to the use of the Social Accounting Matrix (SAM) table, the year 2006 was selected as a reference. Since the CGE model has a static equilibrium orientation, intertemporal analysis is not available in this study.

To validate the model's ability to characterize the behavior of the Thai economy, three macroeconomic variables were examined: Gross Domestic Product (GDP), the Exchange Rate (EXR), and Government Revenue (INC_{gin}). The solution values of these variables were compared to their actual historical values obtained from Central Bank of Thailand (BOT) and the International Monetary Fund (IMF). Overall, the extended CGE model shows that the predicted variables are slightly lower than

Table 4.1: The Selected Macroeconomics Variables of the Baseline Simulation Result

Variable	Unit	Simulation	2006
GDP	Billion Baht	7,464.26	7,848.67*
EXR	Bath/USD	35.00	37.90*
Government Revenue	Billion Baht	1,318.86	1,747.90**

* Bank of Thailand (BOT)
** International Monetary Fund (IMF)

those of the reference year (2006). The result of the baseline is illustrated in Table 4.1.

On the actual production side, the amount of electric power is the most critical variable because it would be translated to costs of fuels and then interacts with the CGE model. The simulated numerical outcome of amount of power generated from different fuel types compared with actual values of the year 2006 is given in Table 4.2. The result confirms that the simulated mixed portfolio is close to actual generation. However, the simulated amount of gas-based electricity slightly surpassed an actual generation value. This may have occurred due to a lack of diesel and other fuel resources in the baseline case. In particular, for gas-based technology, the amount of electricity produced by domestic and imported gas is reported inclusively. To break this down by component, total cost of fuels from the CGE model was used to calibrate the allocation of these two available fuel resources.

Table 4.2: The Electricity Generation Variables of Baseline Simulation Result

Fuel Type	Electricity Production (GWh)		Electricity Production (%)	
	Simulation	2006*	Simulation	2006*
Domestic gas	74,607	94,439**	53.83%	66.56%
Imported gas	24,888	n/a	17.96%	0.00%
Domestic coal	18,118	18,028	13.07%	12.71%
Import coal	1,877	6,441	1.35%	4.54%
Hydro	7,205	7,950	5.20%	5.60%
Oil	6,405	7,808	4.62%	5.50%
Import	5,489	5,152	3.96%	3.63%
Diesel	0	77	0.00%	0.05%
Other sources	0	1,996	0.00%	1.41%
Total	138,589	141,891	100.00%	100.00%

* Energy Statistic of Thailand 2012, EPPO
** The number including electricity produced from domestic and imported gas

4.3 The Simulation Result and Analysis

4.3.1 The Disruption of Imported Natural Gas Case

The first scenario attempts to explore the effects of disruption of imported natural gas from Myanmar in 3 ways: (1) actual generation, (2) macroeconomically, and (3) socio-economically. The extended CGE model with electricity network module was used to capture the impacts of different magnitudes of gas shortages. In this counterfactual scenario, the model simulates the effects of 45%, 75%, and 100% disruption of imported gas supply from Myanmar. From actual generation point of view, the variables considered are the amount of electricity produced from different fuels (Y_j) and unmet demand at each location ($U_{k,t}$). With regard to economics, there are 3 important variables: (1) Gross Domestic Production (GDP), (2) Real Gross Domestic Production (RGDP), and, (3) Price Index (PINDEX). These were selected to be measures the economic health. On socio-economics, four indices were considered: (1) Income of the poor households, (2) Income of non-poor households, (3) Income distribution, and (4) Unemployment rate, were chosen to evaluate the social welfare of the country. It is noted that the index of income of the poor household is derived from the summation of income of households of type 1 to type 3, while income of non-poor household index is obtained from income of household type 4 plus that of type 5. The income distribution index is the ratio of income of the poor household to income of non-poor households.

Overall, the results show that as higher levels of disruption occur, worse impacts to the country are seen in every aspect. Figure 4.1 illustrates the changes in real generation obtained from the electricity network model. Firstly, the figure

confirms that the portion of the electricity generation from imported gas is fallen due to the lower fuel supply. The numerical result of power generation is provided in Table 4.3. By exploring the generation pattern, the generation system response is to compensate for lost power by increasing power produced from imported coal and imported electricity. However, since these two resources account for little generation capacity, they are not able to compensate for this significant power shortage. On the other hand, domestic gas-based power generation also dropped slightly. The detailed result of power generation by plant is provided in Table 4.4. There are three power plants, namely Ratchaburi Power, Ratchaburi Thermal, and Tri Energy, which depend on imported natural gas. The result shows that Ratchaburi Power and Tri Energy are always operated in the case of 45% gas drop but with limited capacity.

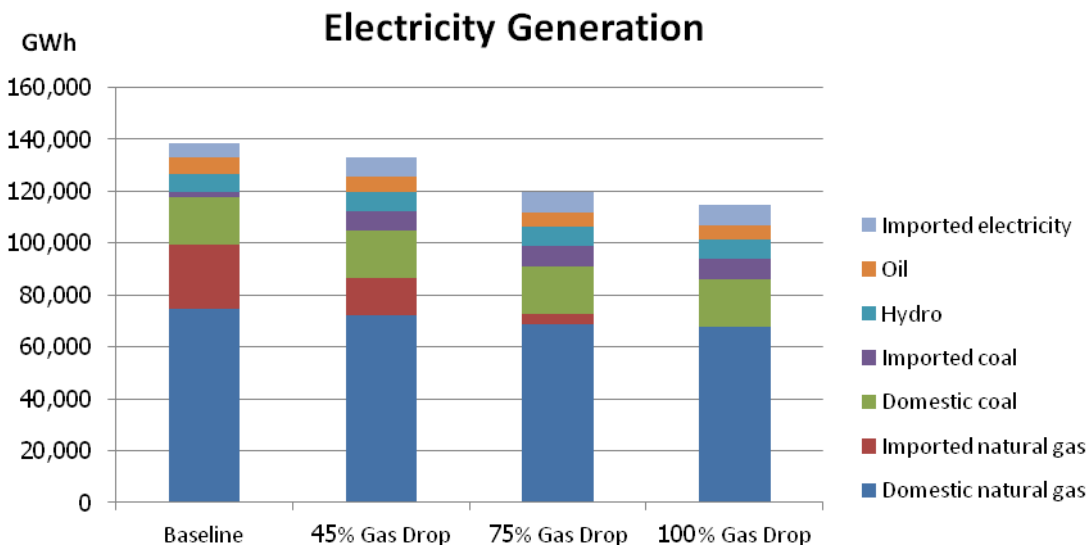

Figure 4.1: Electricity Generation Patterns Responded to Imported Gas Disruption

Table 4.3: The Result of Electricity Generation Configurations Responded to Imported Gas Disruption

Unit: GWh

Fuel	Base case	45%Drop	%Change	75%Drop	%Change	100%Drop	%Change
Domestic natural gas	74,607	72,004	-3.49%	68,848	-7.72%	67,817.51	-9.10%
Imported natural gas	24,888	14,745	-40.76%	3,928	-84.22%	0	-100%
Domestic coal	18,118	18,118	0%	18,118	0%	18,117.71	0%
Imported coal	1,877	7,491	299%	7,987	325.61%	8,149.90	334.30%
Hydro	7,205	7,205	0%	7,205	0%	7,205.43	0%
Oil	6,405	6,085	-5.00%	5,789	-9.62%	5,692.78	-11.12%
Imported electricity	5,489	7,480	36.27%	7,849	42.98%	7,968.99	45.18%
Total	138,589	133,127		119,724		114,952	

An imported gas shortage has different levels of severity in 3 areas: (1) the Metropolitan area (MEA), (2) the central part of the Southern region (DS2), and, (3) the northern part of the Southern region (DS1). Table 4.5 presents numerical results of power shortages in each location. The results show that in every scenario, the metropolitan area always experiences the worst effects. Among the three locations, the result shows that DS1 is affected only when a complete shortage occurs. This effect may be due to the fact that the import gas pipeline is connected to the power plants in this area. Thus the power is produced and consumed locally before distributing to other locations.

The result of Fuel cost and Outage cost is provided in Table 4.6. In the case of complete gas disruption, the result shows that the additional fuel cost is increased by roughly 250 million Thai Baht per day and the Outage cost of roughly 3,500 million Thai Baht per day. To prevent this critical incident, one may suggest building new gas storage. Nonetheless, the cost of establishing new storage facility has rarely been estimated and compared with aforementioned monetary loss. The following analysis would evaluate the feasibility of establishing new gas storage and other possibilities.

Table 4.4: The Detailed Result of Power Generation (MWh/day) by Plant and Fuel of Imported Natural Gas Disruption Case

No.	Power plant	Symbol	Fuel	Baseline			45% Drop			75% Drop			100% Drop		
				Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base
1	Mae Moh	SN1	Domestic Coal	13298.9	25318	10885.1	13298.9	25318	10885.1	13298.9	25318	10885.1	13298.9	25318	10885.1
2	Bhumibol dam	SN2	Water	1000	0	0	1000	2000	0	1000	2000	0	1000	2000	0
3	Sirikit dam	SN3	Water	0	2000	0	0	0	0	0	0	0	0	0	0
4	Nam Phong 2	SN4	Domestic gas	3900	7800	3900	3655.03	7310.06	3655.03	3428.97	6857.94	3428.97	3355.18	6710.36	3355.18
5	Ubolratana dam	SN5	Water	151.2	0	0	151.2	0	0	151.2	0	0	151.2	0	0
6	Lam Takhong dam	SN6	Water	3000	3000	0	3000	3000	0	3000	3000	0	3000	3000	0
7	Chulabhorn dam	SN7	Water	240	288	0	240	288	0	240	288	0	240	288	0
8	Nam Pung dam	SN8	Water	36	21.6	0	36	21.6	0	36	21.6	0	36	21.6	0
9	Pak Mun dam	SN9	Water	816	816	0	816	816	0	816	816	0	816	816	0
10	Sirindhorn dam	SN10	Water	216	216	0	216	216	0	216	216	0	216	216	0
11	LanKrabeau	SN11	Domestic gas	1320.6	0	455	1241.77	0	426.42	1164.97	0	400.047	1139.9	0	391.438
12	Kaeng Koi 2	SN12	Domestic gas	3758.68	6561.15	2839.65	3758.68	2634.27	2839.65	3758.68	5144.98	2839.65	3758.68	6889.99	2839.65
13	Wang Noi	SN13	Domestic gas	0	0	0	0	0	0	0	0	0	0	0	0
14	National Power Supply	SN14	Imported coal	202.724	0	682.782	1512.91	6480	3240	3240	6480	3240	3240	6480	3240
15	Siam Energy	SN15	Domestic gas	5864.92	0	0	4554.74	0	0	2398.49	0	0	1694.64	0	0
16	Bang Pakong	SN16	Domestic gas	15000	30000	12860.4	15000	30000	11478.5	15000	30000	10203.3	15000	30000	9787.01
17	Phan Thong	SN17	Domestic gas & Diesel	300	0	0	300	0	0	300	0	0	300	0	0
18	Kiridharn dam	SN18	Water	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0
19	BLCP	SN19	Imported coal	4241.76	0	0	3334.36	521.603	5377.36	1928.43	985.508	5948.32	2033.88	1137.83	6135.79
20	Rayong	SN20	Domestic gas	7049.94	10338.9	0	7049.94	10528.4	0	7049.94	4568.81	0	7049.94	1698.02	0
21	IPP Dependent	SN21	Domestic gas	4200	8400	4200	4200	8400	4200	4200	8400	4200	4200	8400	4200
22	Bang Bo	SN22	Domestic gas	1026.46	4200	2100	0	4200	2100	0	4200	2100	0	4200	2100
23	South Bangkok	SN23	Domestic gas	7473.54	19200	9600	7773.62	19200	9600	7054.06	19200	9600	6811.87	19200	9600
			Fuel oil	2126.46	0	0	1826.38	0	0	2545.94	0	0	2788.13	0	0
24	NongJok	SN24	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
25	Ratchaburi Power	SN25	Imported gas	5146.84	16800	8400	5750	11806.8	8400	0	0	2800	0	0	0
26	Ratchaburi Thermal	SN26	Imported gas	7153.16	16643.6	3900	0	593.185	0	0	5860	0	0	0	0
27	Srinagarin dam	SN27	Water	2000	1000	0	2000	1000	0	2000	1000	0	2000	1000	0
28	Vajiralongkorn dam	SN28	Water	800	400	0	800	400	0	800	400	0	800	400	0
29	ThaThung Na dam	SN29	Water	200	100	0	200	100	0	200	100	0	200	100	0
30	Tri Energy	SN30	Imported gas	4200	1556.45	4200	4200	8400	1370	3200	0	0	0	0	0
31	KaengKrachan dam	SN31	Water	114	136.8	0	114	136.8	0	114	136.8	0	114	136.8	0
32	Rajjaprabha dam	SN32	Water	1440	576	0	1440	576	0	1440	576	0	1440	576	0
33	Khanom	SN33	Domestic gas	0	0	0	0	0	0	0	0	0	0	0	0
			&Fuel oil	3873.54	8500	3000	3873.54	8074.89	2849.96	2877.16	7682.72	2711.55	2544.69	7554.82	2666.41
34	Krabi	SN34	Fuel oil	0	0	0	0	0	0	0	0	0	0	0	0
35	Chana	SN35	Domestic gas	4166.68	8051.59	3679.65	4166.68	8051.59	3679.65	4166.68	8051.59	3679.65	4166.68	8051.59	3679.65
36	Bang Lang dam	SN36	Water	432	518.4	0	432	518.4	0	432	518.4	0	432	518.4	0
37	Suratthani	SN37	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
38	TheunHinboun dam	SN38	Imported electricity	0	0	0	378.71	293.216	0	769.91	599.45	0	769.91	599.45	0
39	HouayHoa dam	SN39	Imported electricity	756	1512	756	756	1512	756	756	1512	756	756	1512	756
40	Nam Ngum dam	SN40	Imported electricity	900	1800	900	900	1800	900	900	1800	900	900	1800	900
41	Nam Leuk dam	SN41	Imported electricity	360	720	360	360	720	360	360	720	360	360	720	360
42	Malaysia	SN42	Imported electricity	0	0	0	0	0	0	0	0	0	0	0	0
43	North Bangkok	SN43	Domestic gas	4200	7196.44	4200	4128.66	8400	4200	4112.08	8400	4200	4113.97	8400	4200
44	Nam Theun dam	SN44	Imported electricity	2037.66	2789.66	2106.36	1982.75	7338.37	2379.91	1894.41	7484.26	2632.34	1993.27	7631.84	2714.74

Table 4.5: The Result of Electricity Shortage Responded to Imported Gas Disruption

Location	Power Shortage (MWh)		
	Peak load	Intermediate Load	Base load
45% Gas Drop			
DMEA	8,729.88	5,869.81	171.99
DS2	0.00	0.00	150.04
75% Gas Drop			
DMEA	18,748.86	24,457.96	7,833.94
DS2	0.00	0.00	501.67
100% Gas Drop			
DMEA	20,129.06	26,968.80	8,062.72
DS1	2,153.16	4,114.99	2,397.61
DS2	0.00	0.00	753.59

Table 4.6: The Fuel and Outage Cost Incurred from Imported Gas Disruption

Unit:Thai Baht/Day

Fuel Type	Fuel Cost			
	Baseline	45% Drop	75% Drop	100% Drop
Domestic Gas	227,207,100	219,507,100	209,585,900	206,349,600
Import Gas	48,540,010	28,924,130	8,465,948	0
Domestic Coal	13,250,870	13,250,870	13,250,870	13,250,870
Imported Coal	91,499,010	365,231,900	389,431,000	397,376,700
Hydro	204,716	204,716	204,716	204,716
Oil	3,429,590	3,264,524	3,079,033	3,018,284
Imported Electricity	31,182,660	43,693,010	46,010,050	46,766,380
Total	415,313,956	674,076,250	670,027,517	666,966,550

Demand node	Outage Cost			
	Baseline	45% Drop	75% Drop	100% Drop
DMEA	0	782,120,733	2,695,847,523	2,967,584,279
DS2	0	8,123,391	16,570,753	40,801,095
DS1	0	0	0	477,812,675
Total	0	790,244,124	2,712,418,275	3,486,198,049
Fuel and Outage Cost	**415,313,956**	**1,464,320,374**	**3,382,445,792**	**4,153,164,599**

To explore the possibility, the depleted reservoir storage which has the least expensive construction cost is selected as a reference. According to industry estimation, the construction cost of depleted reservoir storage sits roughly at $ 6,600 million USD per MMSCF (International Coach Federation, 2009). With the basecase consumption of imported natural gas at 485 MMSCFD, the new storage capacity would cost about $ 3,201,000 million USD or 105,633,000 million Thai Baht at the exchange rate of 33 Thai baht/USD (given the case of consumption per day as a reference storage capacity). A comparison of construction cost with the incremental cost of fuel and electricity outage cost of approximately 3,750 million Thai Baht per day suggests that it would not be economical to establish a new gas storage facility.

One way to offset a gas disruption would be to retain imported natural gas in the transmission pipeline. Currently Thailand relies on 2 major Myanmar gas wells: Yadana and Yetagun. Total pipeline distance from Yadana to Thai power plants is 649 kilometers (km). Of total length, 409 km. lie on Myanmar side and the rest of 240 km. lies on Thai side. While Yetagun gas well has 170 km of pipeline lies on Myanmar side and shares 240 km of Yadana's. The diameters of both sites pipelines are equal at 28 inches. Considering that the total length of the pipeline system is 819 km, the total volume of the pipeline system without compression is approximately 11.5 MMSCF while the Thai side pipeline volume is s approximately 2.4 MMSCF. Although the amount of gas stored in the pipeline is relatively insignificant compared to daily gas consumption, making full use of the current infrastructure without investment in additional capacity is likely to be one of the appropriate alternatives the government should consider.

Table 4.7: Numerical Result of the Effect of Imported Gas Disruption

Variable	Baseline	45%Drop	%Change	75% Drop	%Change	100% Drop	%Change
Macroeconomics variables							
RGDP	7,464.27	7,461.41	-0.04%	7,458.43	-0.08%	7,457.32	-0.09%
GDP	7,464.27	7,456.35	-0.11%	7,448.56	-0.21%	7,445.71	-0.25%
Price Index	1	0.999323	-0.07%	0.998677	-0.13%	0.998443	-0.16%
Socioeconomic variables							
Income of the poor	1,523.92	1,521.43	-0.16%	1,519.01	-0.32%	1,518.10	-0.38%
Income of the non-poor	3,914.67	3,911.63	-0.08%	3,908.70	-0.15%	3,907.59	-0.18%
Income distribution	38.93%	38.89%	-0.09%	38.86%	-0.17%	38.85%	-0.20%
Unemployment rate	15.00%	15.65%	4.34%	16.31%	8.77%	16.56%	10.37%

From macroeconomic and socio-economic points of view, overall the shortfalls of imported gas result in detrimental effects to the Thai economy. The summary of numerical results is presented in Table 4.7.

From the macroeconomic point of view, the country's GDP and RGDP monotonically decrease as a result of gas disruptions. These effects are graphically illustrated in Figure 4.2. The magnitude of GDP and RGDP reductions is minimal. This may be a result of limiting the simulation to only three locations as mentioned earlier. Of these three locations, the Bangkok Metropolitan area (DMEA) has the highest volume of business activities while the other two locations (DS1 and DS2) serve in tourism and small manufacturing. Therefore, the combination of production loss and limited effects on some locations makes the effect considerably significant on a regional scale. The price index shows a very small drop suggesting that the inflation seems to be almost constant.

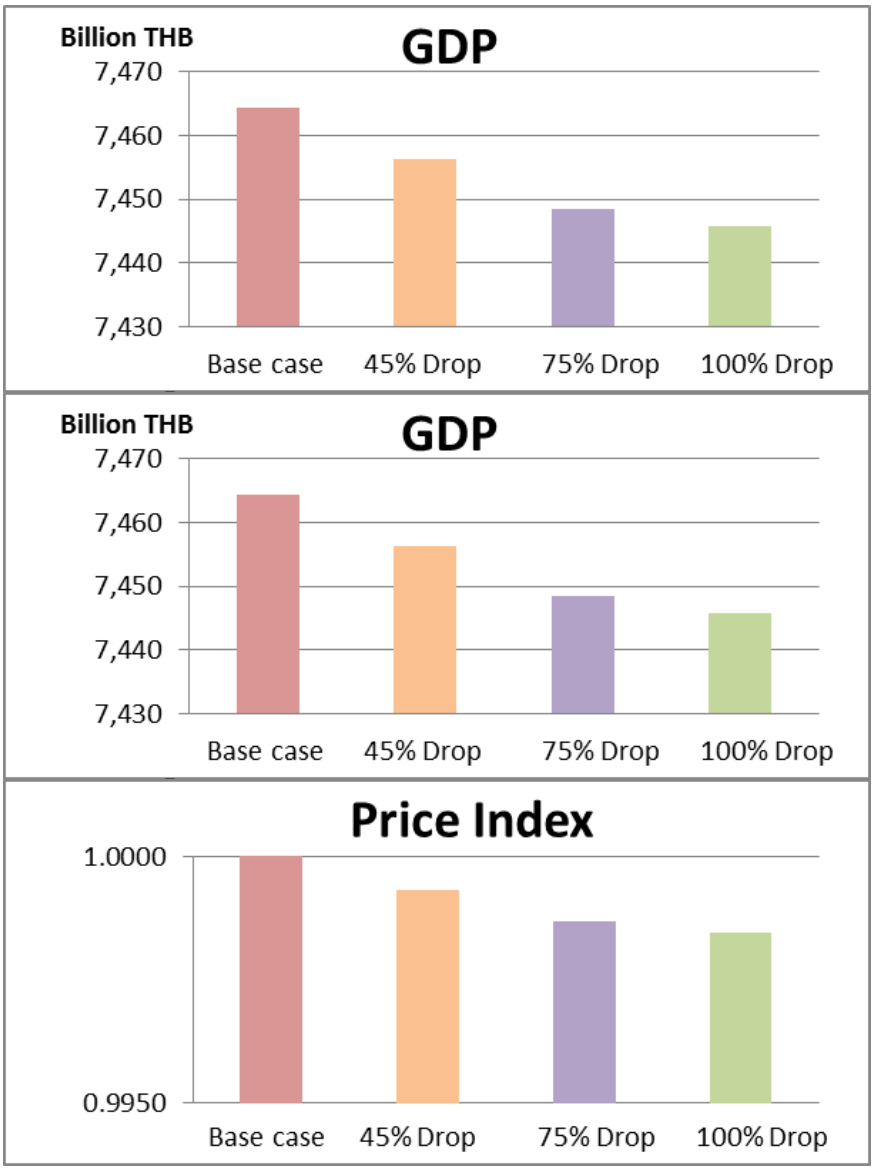

Figure 4.2: The Macroeconomics Indicators Response to Imported Gas Disruption

Table 4.8: Top Five Output Loss Sectors as a Consequence of Imported Gas Shortage

Sector	Description	Basecase	45% Drop	% change	75% Drop	% change	100% Drop	% change
SEC9	Natural gas (raw)	52.369	48.671	-7.062%	45.3926491	-13.322%	43.8109629	-16.342%
SEC18	Natural gas (separated)	101.303	97.183	-4.067%	92.7416016	-8.452%	91.7651272	-9.416%
SEC19	Electricity (Non-renew)	585.314	581.616	-0.632%	578.214628	-1.213%	577.126893	-1.399%
SEC35	Basic Chemical Products	384.842	384.284	-0.145%	383.712942	-0.293%	383.549376	-0.336%
SEC17	Fuel oil	48.884	48.813	-0.145%	48.7475755	-0.278%	48.7246897	-0.325%

Table 4.8 shows the impacts on the five sectors that are hardest hit as a consequence of imported gas shortage. The results are presented in sectoral output values (its price multiplied by quantity) and the percentage change. Almost all industries that lost their outputs are electricity-related industries. By ranking, the two most effected sectors are raw and separated natural gas. The third comes to electricity sector which heavily depend on natural gas followed by Basic Chemical products sector which is expected to use byproduct of natural gas sector. The full report of changing in sectoral output as a consequence of imported natural gas shortage is presented in Table 4.9.

On socio economic impact, all indicators worsen as a consequence of power disruption. As presented in Table 4.7 and Figure 4.3, income of poor households and non-poor households are lowered by increasing magnitudes of import gas disruption. However, the results show that the incomes of non-poor households are less impacted and ultimately yielding an improvement of income distribution between poor and non-poor household. The disruption in power supply also leads to a higher unemployment rate in the long run since there would not be sufficient energy to conduct business activities. In the worst case, the predicted unemployment rate goes up by approximately 1.5% over the baseline.

Table 4.9: The Complete Result of the Change in Sectoral Output as a Consequence of Imported Gas Shortage

Sector	Description	Basecase	45% Drop	% change	75% Drop	% change	100% Drop	% change
SEC1	Agriculture	835.007	834.508	-0.060%	834.01509	-0.119%	833.829767	-0.141%
SEC2	Maize	16.742	16.745	0.017%	16.7477715	0.033%	16.748673	0.038%
SEC3	Casava	30.818	30.806	-0.038%	30.7946751	-0.075%	30.790241	-0.090%
SEC4	Sugarcane	32.873	32.864	-0.027%	32.8544601	-0.057%	32.8505934	-0.069%
SEC5	Sugar Refinery	74.377	74.354	-0.030%	74.3304805	-0.062%	74.3213353	-0.074%
SEC6	Ethanol	1.623	1.625	0.081%	1.6257962	0.158%	1.62620786	0.184%
SEC7	Coal	19.218	20.367	5.977%	21.4284257	11.501%	21.7770577	13.315%
SEC8	Crude oil	225.220	224.933	-0.127%	224.634225	-0.260%	224.546762	-0.299%
SEC9	Natural gas (raw)	52.369	48.671	-7.062%	45.3926491	-13.322%	43.8109629	-16.342%
SEC10	Condensate	27.753	27.745	-0.031%	27.7361957	-0.062%	27.732549	-0.075%
SEC11	Pre-gasoline	42.559	42.525	-0.081%	42.4919629	-0.157%	42.4803751	-0.185%
SEC12	Reg-gasoline	100.825	100.774	-0.050%	100.724686	-0.099%	100.7062	-0.118%
SEC13	Exx (Gasohol)	4.021	4.016	-0.120%	4.0113959	-0.235%	4.00985174	-0.273%
SEC14	Aviation fuel and kerosene	71.700	71.667	-0.046%	71.6337089	-0.092%	71.6221036	-0.108%
SEC15	Diesel	336.897	336.778	-0.035%	336.660297	-0.070%	336.611134	-0.085%
SEC16	Bxx (Diesel-Bio mix)	4.983	4.982	-0.027%	4.98066522	-0.055%	4.9800679	-0.067%
SEC17	Fuel oil	48.884	48.813	-0.145%	48.7475755	-0.278%	48.7246897	-0.325%
SEC18	Natural gas (separated)	101.303	97.183	-4.067%	92.7416016	-8.452%	91.7651272	-9.416%
SEC19	Electricity (Non-renew)	585.314	581.616	-0.632%	578.214628	-1.213%	577.126893	-1.399%
SEC20	Electricity (Renewable)	175.798	175.744	-0.031%	175.684375	-0.065%	175.66737	-0.074%
SEC21	Transportation and Communication	1,194.624	1,193.887	-0.062%	1193.15428	-0.123%	1192.89423	-0.145%
SEC22	Metal Ore and Non-Metal Ore	51.367	51.385	0.035%	51.4017228	0.067%	51.4074861	0.078%
SEC23	Slaughtering	144.927	144.875	-0.036%	144.823816	-0.071%	144.803302	-0.085%
SEC24	Processing and Preserving of Foods	444.645	444.382	-0.059%	444.129817	-0.116%	444.038825	-0.136%
SEC25	Rice and Other Grain Milling	292.040	291.888	-0.052%	291.739976	-0.103%	291.682785	-0.122%
SEC26	Other Foods	147.066	146.967	-0.067%	146.871937	-0.132%	146.835689	-0.156%
SEC27	Animal Food	57.156	57.138	-0.031%	57.1193941	-0.064%	57.1121346	-0.077%
SEC28	Beverages	289.827	289.618	-0.072%	289.414967	-0.142%	289.338179	-0.169%
SEC29	Tobacco Processing and Products	24.773	24.753	-0.081%	24.7334845	-0.160%	24.7261444	-0.189%
SEC30	Spinning and Weaving	338.986	339.109	0.036%	339.229669	0.072%	339.267226	0.083%
SEC31	Textile Bleaching, Made-up, Knitting	116.101	116.055	-0.040%	116.009924	-0.079%	115.993157	-0.093%
SEC32	Wearing Apparels, Carpets and Cordage	411.129	410.859	-0.066%	410.596779	-0.129%	410.497865	-0.153%
SEC33	Paper and Paper Products	153.920	153.846	-0.048%	153.777455	-0.092%	153.752174	-0.109%
SEC34	Printing and Publishing	56.774	56.737	-0.065%	56.7018617	-0.127%	56.688886	-0.150%
SEC35	Basic Chemical Products	384.842	384.284	-0.145%	383.712942	-0.293%	383.549376	-0.336%
SEC36	Fertilizer and Pesticides	21.074	21.056	-0.089%	21.0383828	-0.170%	21.0320112	-0.200%
SEC37	Other Chemical Products	208.450	208.244	-0.099%	208.049539	-0.192%	207.973119	-0.229%
SEC38	Rubber Products	194.816	194.794	-0.011%	194.772823	-0.022%	194.764364	-0.026%
SEC39	Plastic Wares	150.000	149.816	-0.122%	149.644667	-0.237%	149.575809	-0.283%
SEC40	Cement and Concrete Products	161.104	161.191	0.054%	161.272045	0.104%	161.300415	0.122%
SEC41	Other Non-metallic Products	121.501	121.482	-0.016%	121.463439	-0.031%	121.456841	-0.036%
SEC42	Iron and Steel	144.077	143.906	-0.119%	143.744053	-0.231%	143.686964	-0.270%
SEC43	Non-ferrous Metal	48.990	48.978	-0.025%	48.9658309	-0.049%	48.9615919	-0.058%
SEC44	Fabricated Metal Products	219.378	219.244	-0.061%	219.116872	-0.119%	219.071531	-0.140%
SEC45	Industrial Machinery	196.079	196.042	-0.019%	196.006344	-0.037%	195.99266	-0.044%
SEC46	Computers and parts	408.447	408.442	-0.001%	408.436439	-0.003%	408.43456	-0.003%
SEC47	Electrical Machinery and Apparatus	953.042	953.027	-0.002%	953.014375	-0.003%	953.007979	-0.004%
SEC48	Motor Vehicles and Repairing	716.133	716.039	-0.013%	715.94003	-0.027%	715.902418	-0.032%
SEC49	Other Transportation Equipment	80.479	80.450	-0.037%	80.4200778	-0.073%	80.4097011	-0.086%
SEC50	Leather Products	175.378	175.260	-0.067%	175.144567	-0.133%	175.101416	-0.158%
SEC51	Saw Mills and Wood Products	111.164	111.143	-0.019%	111.121714	-0.038%	111.113938	-0.045%
SEC52	Jewelry & Related Articles	299.810	299.700	-0.036%	299.59113	-0.073%	299.550173	-0.087%
SEC53	Other Manufacturing Products	223.378	223.237	-0.063%	223.102714	-0.123%	223.054671	-0.145%
SEC54	Other Public Utilities	31.875	31.859	-0.052%	31.8415083	-0.107%	31.836481	-0.122%
SEC55	Construction	601.567	601.513	-0.009%	601.473231	-0.016%	601.462504	-0.017%
SEC56	Trade	2,140.196	2,137.375	-0.132%	2134.63733	-0.260%	2133.64565	-0.306%
SEC57	Services	2,681.730	2,680.057	-0.062%	2678.51502	-0.120%	2677.93796	-0.141%
SEC58	Unclassified	257.666	257.431	-0.091%	257.202224	-0.180%	257.118126	-0.213%

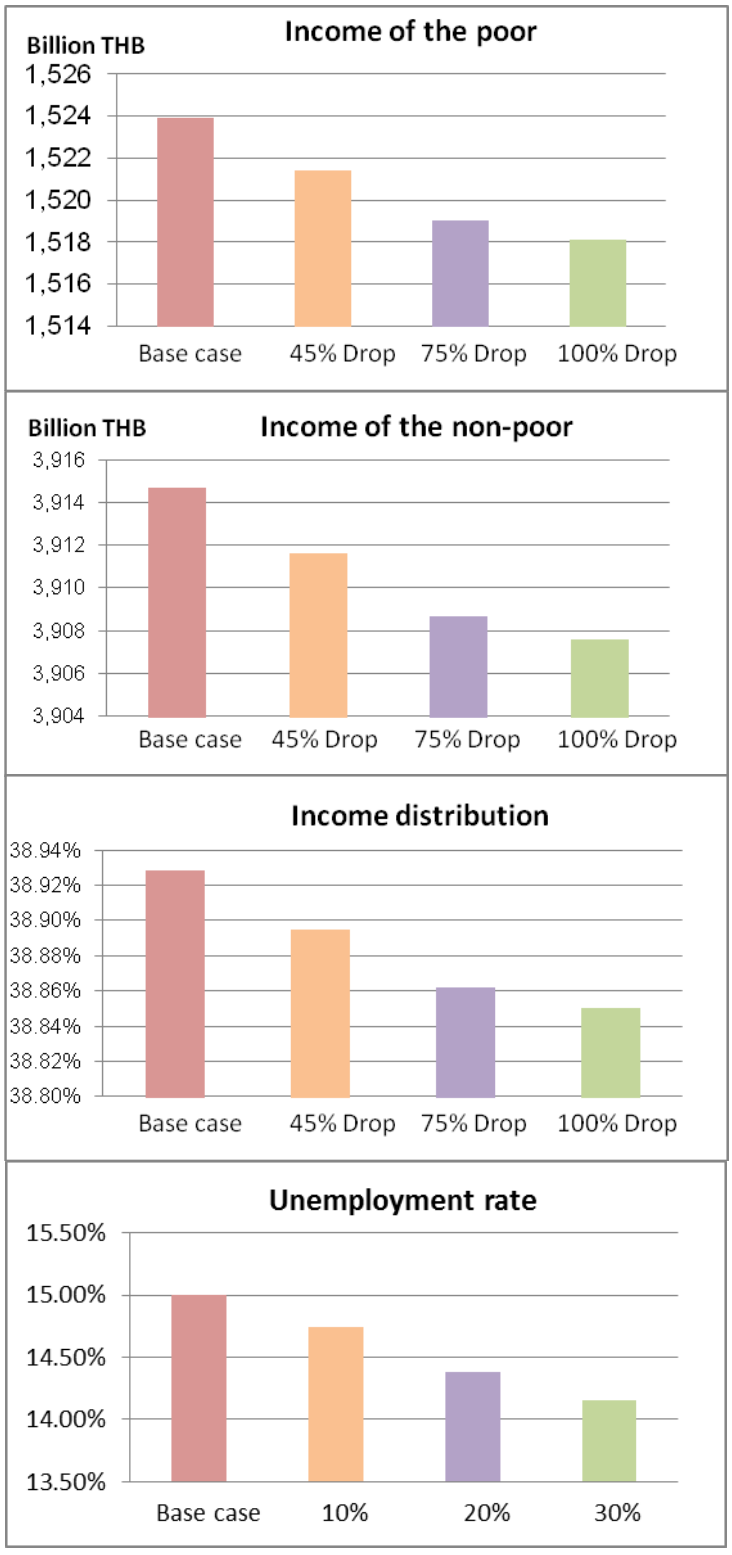

Figure 4.3: The Social Indicators Response to Imported Gas Disruption

When a disruption occurs, the cost of gas-substituted fuels is always paid by Thai government; building new imported gas storage is not recommended due to its massive construction cost. An alternative response to consider that would compensate the government for the additional cost it incurs would be to charge the supplier a penalty fee. Currently, imported natural gas trading contracts are signed on a take-or-pay basis which require that Thailand be responsible for either taking gas produced on a Daily Contracted Quantity (DCQ) basis from Myanmar or paying a penalty. In the situation when the seller is not able to provide the agreed upon minimum gas demand, the current contract expresses that the purchaser is allowed to pay for only the portion of gas received. In addition, the payer has a privilege only to receive a refund of 20-25% of total price of shortage gas for the next purchase (PTT, 2012). The contract, however, does not completely address different levels of gas disruption that perhaps were not anticipated when the contract was signed. As a buyer, Thailand therefore must assume the burden of an unfair trade practice. The result of this experiment provides the data that can be used as a guide for either renewing the existing contract or drafting a new one that is fairer to Thailand. The result of power loss can be interpreted as a referenced scale for different compensation. One advantage of this model is that the quantity loss is provided along with its location which makes it less difficult to view the impact. Coupled with the macroeconomic outcome, policy makers and planners can see a big picture of the impacts of an imported gas shortage which can be used to drive energy policy decisions, such as whether or not to improve the capacity of candidate power plants and transmission cables around the most critical location, the Bangkok metropolitan area and its vicinity.

4.3.2 The Case of Three Different Portfolios of Electricity Generation

This second case aims to investigate an adjustment of the input composition in electricity generation and its consequences. There are 3 important counterfactual scenarios: (2.1) Portfolio 1-Increasing in hydro-power, (2.2) Portfolio 2-Increasing domestic gas-based power with less reliance on imported gas-based power by 14%, (2.3) Portfolio 3-Further dependence on domestic gas-based power and lesser reliance on imported gas-based power by 19%. The first counterfactual scenario follows the Green Energy path as it reduces the consumption of high emission fuels. This scenario deemed to promote the usage of hydro-power which currently accounts for quite small portion (5% of total generation). Since natural gas is still expected to dominate power generation for the next few decades, it is therefore necessary to explore this case. The remaining two scenarios aim to predict the effects of different allocations of domestic and imported gas to power production.

Three scenarios were simulated and investigated using an extended CGE model while the electricity demand was fixed at 138,588.59 GWh per annum as indicated in the base case. These simulations were intended to indicate necessary adjustments of the portfolio mix on the real generation side and their associated macroeconomic responses. The numerical results are presented in Table 4.10 and a graphical representation of this electricity generation portfolio is shown in Figure 4.4. Portfolio 1 shows a significantly greater portion of hydro-power production which is approximately 250% of the baseline while the imported gas-based is cut by about half. Portfolio 2 presents a reduction of imported gas-base power by roughly 70% and larger domestic gas-base power and imported electricity accounting for roughly 14%

and 94% respectively. The proportions of domestic gas-based power and imported electricity are increased by 19% and 45% respectively in Portfolio 3 while the imported gas-based power is reduced by 50%. The full results of power generation by plant and fuel of different portfolios scenarios are displayed in Table 4.11.

Table 4.10: Three Different Portfolios of Electricity Generations

Unit: GWh

Fuel	Base case	Portfolio 1	%Change	Portfolio 2	%Change	Portfolio 3	%Change
Domestic natural gas	74,607	72,283	-3.11%	84901	13.80%	88,819	19.05%
Imported natural gas	24,888	12,821	-48.48%	7267	-70.80%	12,173	-51.09%
Domestic coal	18,118	18,118	0%	18118	0.00%	18,118	0.00%
Imported coal	1,877	0	-100%	8395	347.36%	2,191	16.75%
Hydro	7,205	24,226	236.22%	7205	0.00%	7,205	0.00%
Oil	6,405	6,192	-3.33%	2075	-67.61%	2,099	-67.23%
Imported electricity	5,489	4,949	-9.85%	10628	93.61%	7,983	45.44%
Total	138,589	138,589		138,589		138,589	

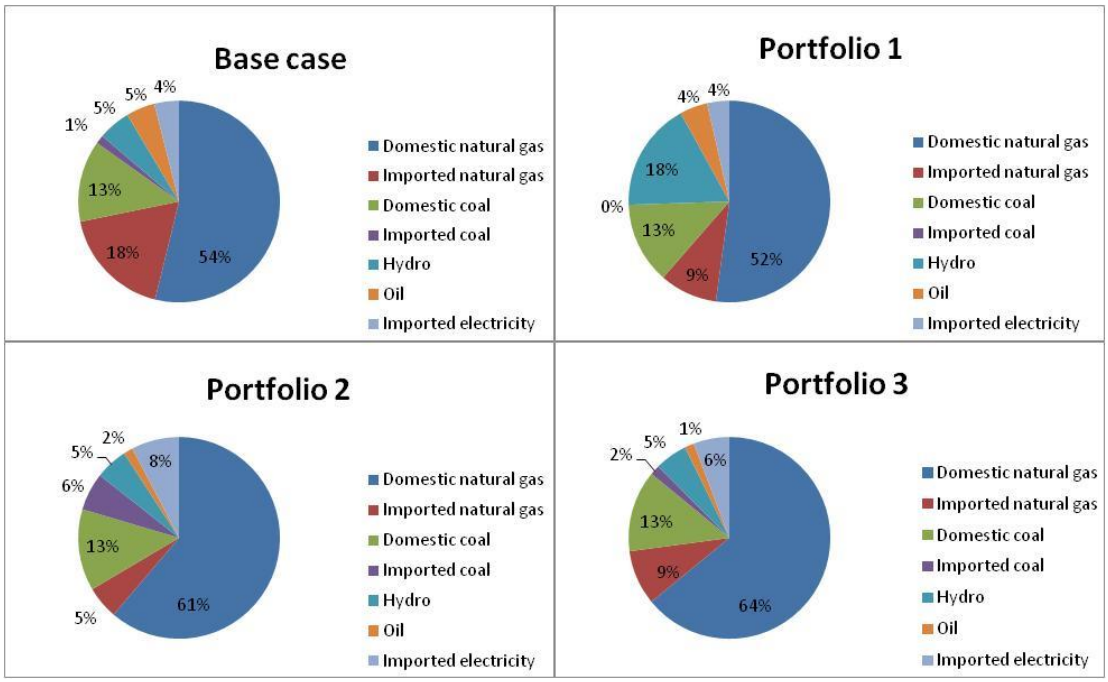

Figure 4.4: The Result of Three Electricity Generation Portfolios

Table 4.11: The Detailed Result of Power Generation (MWh/day) by Plant and Fuel of Different Portfolios Case

No.	Power plant	Symbol	Fuel	Baseline			Portfolio 1			Portfolio 2			Portfolio 3		
				Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base
1	Mae Moh	SN1	Domestic Coal	13298.9	25318	10885.1	13298.9	25318	10885.1	13298.9	25318	10885.1	13298.9	25318	10885.1
2	Bhumibol dam	SN2	Water	1000	0	0	1000	1008.01	0	1000	2000	0	1000	0	0
3	Sirikit dam	SN3	Water	0	2000	0	0	991.99	0	0	0	0	0	2000	0
4	Nam Phong 2	SN4	Domestic gas	3900	7800	3900	3700.6	7800	3900	1252.73	2505.46	1252.73	1291.31	2582.61	0
5	Ubolratana dam	SN5	Water	151.2	0	0	151.2	0	0	151.2	0	0	151.2	0	1291.31
6	Lam Takhong dam	SN6	Water	3000	3000	0	3000	3000	0	3000	3000	0	3000	3000	0
7	Chulabhorn dam	SN7	Water	240	288	0	240	288	0	240	288	0	240	288	0
8	Nam Pung dam	SN8	Water	36	21.6	0	36	21.6	0	36	21.6	0	36	21.6	0
9	Pak Mun dam	SN9	Water	816	816	0	816	816	0	816	816	0	816	816	0
10	Sirindhorn dam	SN10	Water	216	216	0	216	216	0	216	216	0	216	216	0
11	LanKrabeau	SN11	Domestic gas	1320.6	0	455	0	0	91.96	425.608	425.608	146.152	438.713	438.713	150.652
12	Kaeng Koi 2	SN12	Domestic gas	3758.68	6561.15	2839.65	5438.68	10250	4519.65	5438.68	4868.39	2839.65	5438.68	10250	4519.65
13	Wang Noi	SN13	Domestic gas	0	0	0	0	0	0	0	0	0	0	0	0
14	National Power Supply	SN14	Imported coal	202.724	0	682.782	0	0	0	0	5160.76	3206.64	0	0	0
15	Siam Energy	SN15	Domestic gas	5864.92	0	0	5209.67	0	0	6067.64	0	0	6067.64	0	0
16	Bang Pakong	SN16	Domestic gas	15000	30000	12860.4	15000	30000	15000	15000	30000	12060.4	15000	30000	15000
17	Phan Thong	SN17	Domestic gas & Diesel	300	0	0	300	0	0	300	0	0	300	600	0
18	Kiridharn dam	SN18	Water	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0
19	BLCP	SN19	Imported coal	4241.76	0	0	0	0	0	7500	0	7070.02	5986.05	0	0
20	Rayong	SN20	Domestic gas	7049.94	10338.9	0	7049.94	10290.6	267.072	7049.94	9868.19	0	7049.94	14099.9	267.072
21	IPP Dependent	SN21	Domestic gas	4200	8400	4200	4200	8400	4200	4200	8400	4200	4200	8400	4200
22	Bang Bo	SN22	Domestic gas	1026.46	4200	2100	2100	4200	2100	2100	4200	2100	2100	4200	2100
23	South Bangkok	SN23	Domestic gas	7473.54	19200	9600	9600	19200	9600	9206.61	28800	14400	9133.78	28800	14400
			Fuel oil	2126.46	0	0	0	0	0	1943.56	0	0	1966.12	0	0
24	NongJok	SN24	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
25	Ratchaburi Power	SN25	Imported gas	5146.84	16800	8400	6026.95	11266.9	4986.36	618.053	910.056	309.026	0	15267	892.949
26	Ratchaburi Thermal	SN26	Imported gas	7153.16	16643.6	3900	706.084	949.384	2881.29	0	910.056	309.026	6595.95	0	5411.4
27	Srinagarin dam	SN27	Water	2000	1000	0	9600	19200	9318.45	2000	1000	0	2000	1000	0
28	Vajiralongkorn dam	SN28	Water	800	400	0	1740	3480	0	800	400	0	800	400	0
29	ThaThung Na dam	SN29	Water	200	100	0	1500	3000	840	200	100	0	200	100	0
30	Tri Energy	SN30	Imported gas	4200	1556.45	4200	1767.16	5814.4	632.537	4200	8400	4200	4200	0	892.949
31	KaengKrachan dam	SN31	Water	114	136.8	0	500	1000	500	114	136.8	0	114	136.8	0
32	Rajjaprabha dam	SN32	Water	1440	576	0	1440	576	576	1440	576	0	1440	576	0
33	Khanom	SN33	Domestic gas	0	0	0	5800.21	8216.96	2900.1	6000	12000	6000	6000	12000	6000
			&Fuel oil	3873.54	8500	3000	0	0	0	0	0	0	0	0	0
34	Krabi	SN34	Fuel oil	0	0	0	0	0	0	0	2753.37	971.78	0	2785.33	983.06
35	Chana	SN35	Domestic gas	4166.68	8051.59	3679.65	2240.01	3816.59	3020.97	2040.22	2498.99	967.87	2040.22	2467.03	956.59
36	Bang Lang dam	SN36	Water	432	518.4	0	432	518.4	0	432	518.4	0	432	518.4	0
37	Suratthani	SN37	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
38	TheunHinboun dam	SN38	Imported electricity	0	0	0	378.71	311.45	0	821.94	1453.99	0.00	783.36	1376.84	0
39	HouayHoa dam	SN39	Imported electricity	756	1512	756	756	1512	756	756	1512	756	756	1512	756
40	Nam Ngum dam	SN40	Imported electricity	900	1800	900	900	1800	472.51	900	1800	900	900	1800	900
41	Nam Leuk dam	SN41	Imported electricity	360	720	360	360	720	360	360	720	360	360	720	360
42	Malaysia	SN42	Imported electricity	0	0	0	0	0	0	0	0	0	0	0	0
43	North Bangkok	SN43	Domestic gas	4200	7196.44	4200	6000	0	0	10000	14326.2	1027.99	5586.32	9586.81	5718.76
44	Nam Theun dam	SN44	Imported electricity	2037.66	2789.66	2106.36	1498.95	2478.21	1216.89	3077.98	10556.6	5062.48	3064.88	5183.49	3339.4

Table 4.12 illustrates the breakdown fuel cost of each portfolio. As a result of higher hydro-based power supply, portfolio 1 shows the lowest cost of fuel. An increase in Hydro-based power completely eradicates imported coal-based power and reduces the consumption of imported gas by half. Next Portfolio 3, domestic gas dominated portfolio, shows the second best alternative in fuel cost. Comparing with the basecase, Portfolio 3 lowers cost of imported gas by half and slightly increases cost of imported coal. Lastly, Portfolio 2 shows an attempt to reduce imported gas and electricity by two thirds. Whereas the generation system unfavorably responses by shifting to more expensive imported coal. Interestingly, Portfolio 2 turns out to be the most costly scenario.

From the fuel cost perspective, Portfolio 1 seems to be the most desirable. However, excess hydro-based power may cause the shortage of water for agricultural activities or, in the worst case, sudden flood. Therefore, water management needs to be extensively studied and evaluated before following this direction. Portfolio 3 is the second best direction. Although, its cost is slightly higher than the current base case, a reduction of imported gas by half significantly helps promote the country's energy security.

Table 4.12: The Fuel Cost Incurred from Different Portfolios

Unit:Thai Baht/Day

Fuel Type	Fuel Cost			
	Base case	Portfolio 1	Portfolio 2	Portfolio 3
Domestic Gas	227,207,100	215,994,400	261,714,400	271,906,200
Import Gas	48,540,010	25,006,020	14,173,840	23,741,950
Domestic Coal	13,250,870	13,250,870	13,250,870	13,250,870
Imported Coal	91,499,010	0	409,331,800	106,824,700
Hydro	204,716	558,513	204,716	204,716
Oil	3,429,590	3,383,918	1,069,104	1,081,513
Imported Electricity	31,182,660	27,785,660	63,473,040	46,855,520
Total	415,313,956	285,979,381	763,217,770	463,865,469

Table 4.13: Variables' Responses to Three Different Portfolios

Variable	Base case	Portfolio 1	%change	Portfolio 2	%change	Portfolio 3	%change
Macroeconomics variables							
RGDP	7,464.27	7,462.41	-0.02%	7,483.04	0.25%	7,485.40	0.28%
GDP	7,464.27	7,459.07	-0.07%	7,426.34	-0.51%	7,430.02	-0.46%
Price Index	1	0.999553	-0.04%	0.992423	-0.76%	0.992602	-0.74%
Socioeconomic variables							
Income of the poor	1,523.92	1,522.28	-0.11%	1,512.25	-0.77%	1,513.34	-0.69%
Income of the non-poor	3,914.67	3,912.67	-0.05%	3,900.48	-0.36%	3,901.81	-0.33%
Income distribution	38.93%	38.91%	-0.06%	38.77%	-0.41%	38.79%	-0.37%
Unemployment rate	15.00%	15.43%	2.84%	13.68%	-8.83%	13.27%	-11.55%

In terms of macroeconomic and socio-economic criteria, model solutions indicate that Portfolio 3, with its heavy domestic gas dependence, would outperform the other two portfolios of fuel stocks. The numerical results are presented in Table 4.13

On the macroeconomics level, the result shows that Portfolio 3 is the best to help improve the real GDP (RGDP) and curb inflation (PINDEX) followed by Portfolio 2. Although, Portfolio 2 may performs better in inflation control, Portfolio 1 wins in the final result in terms of real GDP (RGDP). The heavier use of domestic gas therefore brings a positive effect to the economy as it helps stimulate domestic energy-related activities and reduces the cost of imported gas. Interestingly, Portfolio 1 does

not contribute much on the economics level and even brings an adverse effect to the real GDP (RGDP). This may due to the fact that most of the hydro-power belongs to EGAT, a government authority which has little spillover effect to other industries. Figure 4.5 shows the graphical representation of three macroeconomic variables.

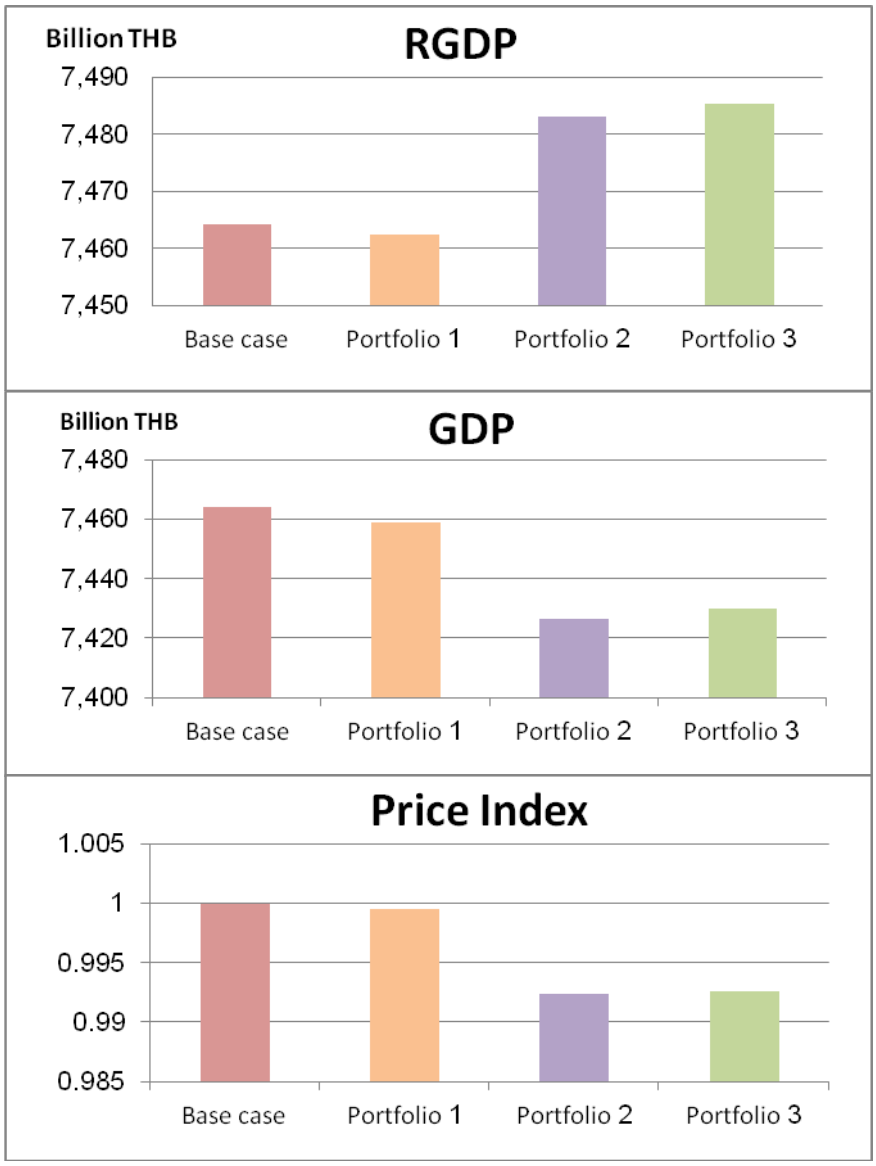

Figure 4.5: The Change of Macroeconomic Variables Compared to the Baseline under Different Electricity Generation Portfolios

Table 4.14 presents impacts on the five sectors that would benefit most economically from adopting the three different portfolios. At equilibrium, all sectoral outputs adjust according to various allocations of power fuel feedstock. Overall, the Coal sector is always ranked among top of positive gainers for all scenarios. Therefore, it can be inferred that coal is one of the most significantly substitutable fuels for national power generation. Considering portfolio 1, Hydro power dominated the portfolio, ethanol gains the second most positive effect, followed by Cement and Concrete Products. In the domestic gas dominated cases, Portfolio 2 and Portfolio 3, four out of the five sectors (Electricity, Raw natural gas, Separated natural gas, and Coal) that rank among the top five gainers are electricity related sectors. The electricity sector's output increases by 5.78% and 6.55% in the cases of Portfolio 2 and 3, respectively. Hence, the simulation outcomes reveal the positive relationship of consuming more domestic gas in power production and electricity sector output. The complete result of the change in sectoral output is presented in Table 4.15.

Table 4.14: Top Five Output Gained Sectors as a Consequence of Portfolio Changed

Sector	Description	Basecase	Portfolio 1	% change
SEC7	Coal	19.218	19.983	3.978%
SEC6	Ethanol	1.623	1.624	0.054%
SEC40	Cement and Concrete Products	161.104	161.162	0.036%
SEC30	Spinning and Weaving	338.986	339.068	0.024%
SEC22	Metal Ore and Non-Metal Ore	51.367	51.379	0.023%

Sector	Description	Basecase	Portfolio 2	% change
SEC19	Electricity (Non-renew)	585.314	619.159	5.78%
SEC7	Coal	19.218	20.053	4.34%
SEC9	Natural gas (raw)	52.369	54.253	3.60%
SEC18	Natural gas (separated)	101.303	101.980	0.67%
SEC40	Cement and Concrete Products	161.104	161.679	0.36%

Sector	Description	Basecase	Portfolio 3	% change
SEC9	Natural gas (raw)	52.369	56.459	7.81%
SEC19	Electricity (Non-renew)	585.314	623.650	6.55%
SEC7	Coal	19.218	20.284	5.55%
SEC18	Natural gas (separated)	101.303	104.782	3.43%
SEC40	Cement and Concrete Products	161.104	161.655	0.34%

Table 4.15: The Complete Result of the Change in Sectoral Output as a Consequence of Different Portfolio

Sector	Description	Basecase	Portfolio 1	% change	Portfolio 2	% change	Portfolio 3	% change
SEC1	Agriculture	835.007	834.681	-0.039%	833.252	-0.210%	833.504	-0.180%
SEC2	Maize	16.742	16.744	0.011%	16.730	-0.075%	16.728	-0.084%
SEC3	Casava	30.818	30.810	-0.025%	30.731	-0.281%	30.736	-0.265%
SEC4	Sugarcane	32.873	32.868	-0.017%	32.970	0.295%	32.980	0.325%
SEC5	Sugar Refinery	74.377	74.362	-0.020%	74.357	-0.027%	74.372	-0.006%
SEC6	Ethanol	1.623	1.624	0.054%	1.614	-0.547%	1.614	-0.591%
SEC7	Coal	19.218	19.983	3.978%	20.053	4.344%	20.284	5.546%
SEC8	Crude oil	225.220	225.031	-0.084%	223.984	-0.549%	224.125	-0.486%
SEC9	Natural gas (raw)	52.369	49.933	-4.652%	54.253	3.596%	56.459	7.810%
SEC10	Condensate	27.753	27.748	-0.020%	27.742	-0.043%	27.747	-0.023%
SEC11	Pre-gasoline	42.559	42.536	-0.053%	42.256	-0.713%	42.265	-0.690%
SEC12	Reg-gasoline	100.825	100.792	-0.033%	100.360	-0.460%	100.380	-0.441%
SEC13	Exx (Gasohol)	4.021	4.018	-0.080%	3.957	-1.594%	3.958	-1.573%
SEC14	Aviation fuel and kerosene	71.700	71.678	-0.031%	71.304	-0.552%	71.314	-0.538%
SEC15	Diesel	336.897	336.820	-0.023%	335.863	-0.307%	335.924	-0.289%
SEC16	Bxx (Diesel-Bio mix)	4.983	4.983	-0.017%	4.964	-0.381%	4.965	-0.367%
SEC17	Fuel oil	48.884	48.837	-0.096%	47.969	-1.872%	47.978	-1.852%
SEC18	Natural gas (separated)	101.303	98.589	-2.679%	101.980	0.668%	104.782	3.434%
SEC19	Electricity (Non-renew)	585.314	582.850	-0.421%	619.159	5.782%	623.650	6.550%
SEC20	Electricity (Renewable)	175.798	175.763	-0.020%	174.719	-0.614%	174.735	-0.605%
SEC21	Transportation and Communication	1,194.624	1,194.140	-0.040%	1,187.828	-0.569%	1,188.110	-0.545%
SEC22	Metal Ore and Non-Metal Ore	51.367	51.379	0.023%	51.498	0.254%	51.494	0.246%
SEC23	Slaughtering	144.927	144.893	-0.023%	144.373	-0.382%	144.395	-0.367%
SEC24	Processing and Preserving of Foods	444.645	444.472	-0.039%	443.415	-0.277%	443.521	-0.253%
SEC25	Rice and Other Grain Milling	292.040	291.941	-0.034%	291.182	-0.294%	291.251	-0.270%
SEC26	Other Foods	147.066	147.001	-0.044%	146.376	-0.469%	146.416	-0.442%
SEC27	Animal Food	57.156	57.144	-0.020%	57.264	0.188%	57.279	0.216%
SEC28	Beverages	289.827	289.689	-0.047%	288.534	-0.446%	288.622	-0.416%
SEC29	Tobacco Processing and Products	24.773	24.760	-0.053%	24.683	-0.362%	24.692	-0.326%
SEC30	Spinning and Weaving	338.986	339.068	0.024%	338.181	-0.238%	338.117	-0.256%
SEC31	Textile Bleaching, Made-up, Knitting	116.101	116.071	-0.026%	115.846	-0.220%	115.866	-0.203%
SEC32	Wearing Apparels, Carpets and Cordage	411.129	410.952	-0.043%	409.700	-0.348%	409.819	-0.319%
SEC33	Paper and Paper Products	153.920	153.871	-0.031%	153.124	-0.517%	153.142	-0.505%
SEC34	Printing and Publishing	56.774	56.750	-0.043%	56.444	-0.581%	56.456	-0.559%
SEC35	Basic Chemical Products	384.842	384.474	-0.095%	381.715	-0.812%	381.949	-0.752%
SEC36	Fertilizer and Pesticides	21.074	21.062	-0.059%	20.868	-0.976%	20.872	-0.959%
SEC37	Other Chemical Products	208.450	208.314	-0.065%	207.277	-0.563%	207.356	-0.525%
SEC38	Rubber Products	194.816	194.802	-0.007%	194.695	-0.062%	194.706	-0.056%
SEC39	Plastic Wares	150.000	149.879	-0.081%	148.780	-0.813%	148.848	-0.768%
SEC40	Cement and Concrete Products	161.104	161.162	0.036%	161.679	0.357%	161.655	0.342%
SEC41	Other Non-metallic Products	121.501	121.488	-0.010%	121.315	-0.153%	121.321	-0.148%
SEC42	Iron and Steel	144.077	143.963	-0.078%	143.497	-0.402%	143.559	-0.359%
SEC43	Non-ferrous Metal	48.990	48.982	-0.017%	48.974	-0.033%	48.979	-0.022%
SEC44	Fabricated Metal Products	219.378	219.289	-0.041%	218.709	-0.305%	218.755	-0.284%
SEC45	Industrial Machinery	196.079	196.055	-0.012%	196.308	0.117%	196.335	0.131%
SEC46	Computers and parts	408.447	408.443	-0.001%	408.467	0.005%	408.470	0.006%
SEC47	Electrical Machinery and Apparatus	953.042	953.033	-0.001%	953.060	0.002%	953.069	0.003%
SEC48	Motor Vehicles and Repairing	716.133	716.072	-0.009%	716.760	0.088%	716.842	0.099%
SEC49	Other Transportation Equipment	80.479	80.460	-0.024%	80.538	0.073%	80.556	0.095%
SEC50	Leather Products	175.378	175.300	-0.044%	174.811	-0.323%	174.865	-0.293%
SEC51	Saw Mills and Wood Products	111.164	111.150	-0.013%	111.002	-0.146%	111.010	-0.139%
SEC52	Jewelry & Related Articles	299.810	299.738	-0.024%	299.886	0.026%	299.954	0.048%
SEC53	Other Manufacturing Products	223.378	223.284	-0.042%	222.340	-0.464%	222.384	-0.445%
SEC54	Other Public Utilities	31.875	31.865	-0.034%	31.695	-0.565%	31.702	-0.546%
SEC55	Construction	601.567	601.530	-0.006%	598.202	-0.559%	598.133	-0.571%
SEC56	Trade	2,140.196	2,138.341	-0.087%	2,122.561	-0.824%	2,123.689	-0.771%
SEC57	Services	2,681.730	2,680.621	-0.041%	2,653.463	-1.054%	2,653.633	-1.048%
SEC58	Unclassified	257.666	257.512	-0.060%	256.883	-0.304%	256.992	-0.262%

Regarding socio-economic indicators, Portfolio 3 performs well in terms of reducing the unemployment rate and income distribution. However, in detail it does worsen income of poor and non-poor households. Portfolio 1 has a minimal effect on household income but fails to control the unemployment rate and income distribution. Portfolio 1 and 3 therefore can be regarded as reflecting a trade-off in socio-economic impacts when promoting hydro and domestic gas-base technologies. Although the results shows nominal incomes of households are slightly lower than that of the baseline in all 3 cases, the real incomes of households would be higher due to inflation. The result of changes in household income in all cases thus would hurt the economy less than one expects as presented in Figure 4.6.

In sum, this case provides evidence to support the promotion of hydro and domestic natural gas used in power generation. Although increased Hydro-based energy would reduce emissions, it may not be such an attractive alternative because its capacity may not compete with existing gas-based power resources or be able to meet continuously increasing demand in the long run. Furthermore, issues of water management, especially the volume of released water and environmental impacts, have to be carefully studies and evaluated.

The results next show that heavier reliance on domestic gas helps improve macroeconomic conditions as well as particular socio-economic conditions. Regarding technology, most of the current gas-base power plants in Thailand are combine-cycle plants which can be upgraded in terms of production systems and capacity. On the physical procurement, the majority of the domestic gas supply is delivered from the Gulf of Thailand to feed power plants in the Eastern and Central areas of the country.

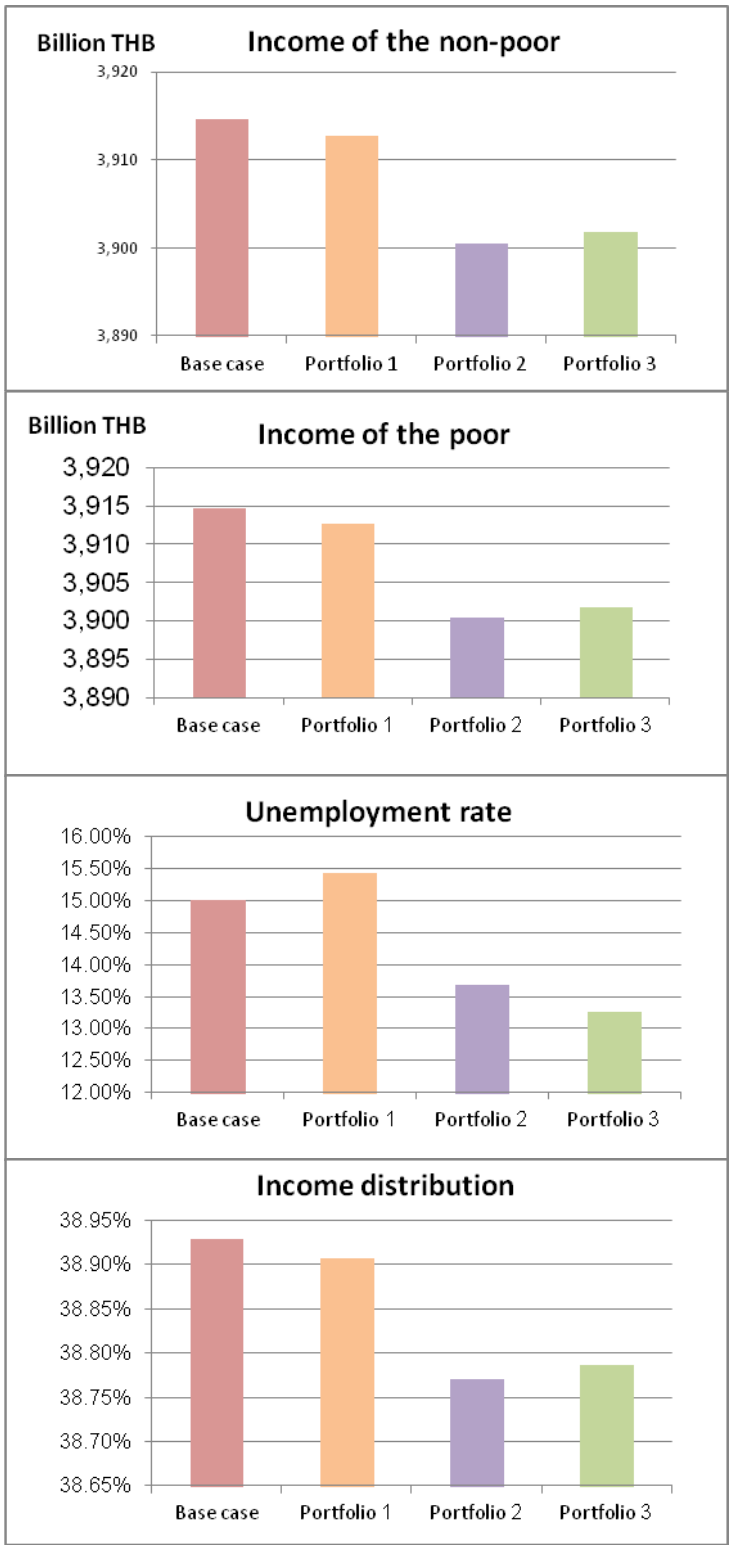

Figure 4.6: The Change of Socio-economic Variables Compared to the Baseline under Different Electricity Generation Portfolios

Even though concern about gas reserve depletion exists, the country has some prospective resources for gas replacement. On a small scale, biogas from agricultural and farming waste would be another alternative to offset current usage. On a large scale, according to one industry estimate, a possibility is a raw gas well lain beneath the disputed overlapping area of Thailand and Cambodia which is estimated to have at least six Tera cubic feet of natural gas (EIA, 2012). This could relieve Thailand from gas shortages for at least four years with the current consumption rate of approximately 4,000 MMSCFD.

Regarding policy makers, this case study has a twofold application. First, it gives a warning to the government authorities for the preparation and acquisition of gas inventory in near future as well as motivates Thailand and Cambodia to begin peaceful dialogue for joint offshore energy exploration along their disputed sea border. Second, since domestic gas is expected to be the least expensive among fossil fuel choices, if the government decides to follow either Portfolio 2 or 3, electricity tariff should be revamped. Currently, the structure of electricity tariff in Thailand has two major elements, Base Tariff and Automatic Tariff Adjustment (F_t). Fuel cost is represented in both base tariff and F_t. The estimation of the weighted average of mixed fuels costs is included in the base tariff and it would be readjusted to actual cost at the time of purchase by F_t. Once a higher share of domestic gas is present in the portfolio, the weighted average of cost of mixed fuels should be lower. Further, the improvement of domestic gas price stability would lead to less F_t adjustment. The twin reduction in fuel cost and fluctuation resulting from higher share of domestic natural gas therefore should eventually push the electricity tariff down.

4.3.3 The Case of Rising in Investment and Local Electricity Consumption

The impact of the incoming ASEAN Economic Community (AEC) will certainly promote trade liberalization and investment among Southeast Asian countries and ultimately stimulated ASEAN member countries' economy. Situated in the central of this region, Thailand is expected to flourish in trading and investment from this scheme. Economic growth is always perceived to cause soaring consumption for electricity. This case study has aimed to investigate the impact of national investment and higher consumption of electricity in three locations, the Bangkok metropolitan area (DMEA), the Northern part of the Central region (DC1) and the Eastern region (DC2). In Thailand, these locations, which are home to various businesses and manufacturing clusters, are expected to benefit much from the AEC framework.

This third case simulates the effect of increasing in national investment by 2%, 5%, and 7% as well as growing loads in the three above locations to 3 different levels, 10%, 20%, and 30%. The details of estimated increased electricity consumption are shown in Table 4.16. Increasing power consumption without significant supply improvements definitely encourages system failure. Therefore, it is most important to identify the potential power failure locations. Table 4.17 presents the simulated result of these blackout locations and amount of resulting deficiencies. The result shows that the outages occur only after the demand exceeds 20%, an increment that corresponds to power reserve margin. By location, the Bangkok metropolitan area is the most critical, followed by the Eastern region. However, in reality the Eastern region seems to be well prepared in terms of number of power plants and their installed capacities. This region also is regularly monitored since it is an industrial intensive zone

Table 4.16: The Increase in Consumption for Local Electricity

Unit MWh

Demand Node	Peak Load	Intermediate Load	Base Load
DN1	2,601.44	4,758.55	1,629.49
DN2	2,844.64	4,992.03	1,792.51
DN3	3,758.68	6,889.99	2,839.65
DNE1	3,709.91	6,479.45	2,512.51
DNE2	3,286.95	5,022.21	1,972.89
DNE3	4,695.96	8,479.96	3,039.45
DC1	9,857.49	18,879.40	8,415.58
DC2	27,894.38	46,959.86	14,667.07
DC3	10,388.55	19,461.80	5,358.45
DMEA	31,684.51	41,700.00	27,300.00
DS1	4,125.16	7,942.59	3,237.61
DS2	4,473.54	8,096.77	3,420.00
DS3	3,758.68	6,889.99	2,839.65
Total	**113,079.89**	**186,552.60**	**79,024.86**
	Daily Grand Total		**378,657.35**
	Annual Grand Total		**138,588,589.37**

The Basecase

Unit MWh

Demand Node	Peak Load	Intermediate Load	Base Load
DN1	2,601.44	4,758.55	1,629.49
DN2	2,844.64	4,992.03	1,792.51
DN3	3,758.68	6,889.99	2,839.65
DNE1	3,709.91	6,479.45	2,512.51
DNE2	3,286.95	5,022.21	1,972.89
DNE3	4,695.96	8,479.96	3,039.45
DC1	10,843.24	20,767.34	9,257.14
DC2	30,683.82	51,655.84	16,133.78
DC3	10,388.55	19,461.80	5,358.45
DMEA	34,852.96	45,870.00	30,030.00
DS1	4,125.16	7,942.59	3,237.61
DS2	4,473.54	8,096.77	3,420.00
DS3	3,758.68	6,889.99	2,839.65
Total	**120,023.53**	**197,306.52**	**84,063.13**
	Daily Grand Total		**401,393.18**
	Annual Grand Total		**146,909,902.71**

Scenario 3.1 : 10% increasing in local power demand

Unit MWh

Demand Node	Peak Load	Intermediate Load	Base Load
DN1	2,601.44	4,758.55	1,629.49
DN2	2,844.64	4,992.03	1,792.51
DN3	3,758.68	6,889.99	2,839.65
DNE1	3,709.91	6,479.45	2,512.51
DNE2	3,286.95	5,022.21	1,972.89
DNE3	4,695.96	8,479.96	3,039.45
DC1	13,011.89	24,920.81	11,108.57
DC2	36,820.59	61,987.01	19,360.54
DC3	10,388.55	19,461.80	5,358.45
DMEA	41,823.55	55,044.00	36,036.00
DS1	4,125.16	7,942.59	3,237.61
DS2	4,473.54	8,096.77	3,420.00
DS3	3,758.68	6,889.99	2,839.65
Total	**135,299.53**	**220,965.16**	**95,147.31**
	Daily Grand Total		**451,412.00**
	Annual Grand Total		**165,216,792.06**

Scenario 3.2 : 20% increasing in local power demand

Unit MWh

Demand Node	Peak Load	Intermediate Load	Base Load
DN1	2,601.44	4,758.55	1,629.49
DN2	2,844.64	4,992.03	1,792.51
DN3	3,758.68	6,889.99	2,839.65
DNE1	3,709.91	6,479.45	2,512.51
DNE2	3,286.95	5,022.21	1,972.89
DNE3	4,695.96	8,479.96	3,039.45
DC1	16,915.45	32,397.05	14,441.14
DC2	47,866.76	80,583.11	25,168.70
DC3	10,388.55	19,461.80	5,358.45
DMEA	54,370.61	71,557.20	46,846.80
DS1	4,125.16	7,942.59	3,237.61
DS2	4,473.54	8,096.77	3,420.00
DS3	3,758.68	6,889.99	2,839.65
Total	**162,796.34**	**263,550.70**	**115,098.84**
	Daily Grand Total		**541,445.88**
	Annual Grand Total		**198,169,192.89**

Scenario 3.3 : 30% increasing in local power demand

Table 4.17: The Results of Electricity Shortages as a Result of Increasing in Investment and Local Electricity Consumption

Location	Power Shortage (MWh/day)		
	Peak load	Intermediate Load	Base load
Scenario 3.1			
None	0	0	0
Scenario 3.2			
DMEA	7,766.99	0	0
DS2	0	0	19.68
Scenario 3.3			
DC2	3,022.95	5,327.48	0
DMEA	20,509.25	9,088.78	1,802.26

To deal with this increasing consumption, two candidate power plants, South Bangkok and Siam Energy, are considered for upgrades in their capacities. Although many feasible alternatives exist, these two power resources are the most attractive because of their significant power outputs and the shortest distance from the high demand: metropolitan and eastern area. For further simulation, the capacity of these two power stations was assumed to be increased from 1,500 MW to 3,700 MW for the South Bangkok power station and from 1,500 MW to 2,500 MW for Siam Energy power station.

The result of change in electricity generation configuration is presented in Table 4.18 as well as in the graphical illustration representation of Figure 4.7. The result shows that both imported and domestic gas still dominate other fuels in all scenarios. The system responds to a 10% increase in local power consumption with a 17% increase in imported gas-based power while maintaining an almost constant portion of domestic gas-based power. In the case of 20% and 30% increases in local power consumption, the share of domestic natural gas-based power is greater by approximately 8% and 43%, respectively, while the portion of imported natural gas-based power is expanded by roughly 65% and 83%, respectively. Power from domestic coal also presents a significant larger portion. These outcomes ensue because increasing power consumption at the Northern part of the Central region (DC1) can be balanced by a domestic coal power plant via a 500kv power line. The portion of hydro-power remains stable since none of hydro-power resources are near these three locations with increasing consumption. The higher portion of gas is contributed to less imported electricity from neighboring countries. The results show a decline of roughly

4% and 10% in scenario 3.2 and 3.3, respectively. The details of power generation by plant and fuel are provided in Table 4.19.

Table 4.18: Electricity Generation Configuration Responses to Increasing Investment and Local Electricity Consumption

Unit: GWh

Fuel	Base case	Scenario 3.1	%Change	Scenario 3.2	%Change	Scenario 3.3	%Change
Domestic natural gas	74,607	74,330.45	-0.37%	80,745.29	8.23%	106,563.50	42.83%
Imported natural gas	24,888	29,097.00	16.91%	40,992.00	64.71%	45,422.56	82.51%
Domestic coal	18,118	19,477.49	8%	22,211.59	22.60%	23,058.00	27.27%
Imported coal	1,877	2,733.08	46%	1,147.25	-38.86%	3,337.81	77.87%
Hydro	7,205	7,205.43	0.00%	7,205.43	0.00%	7,205.43	0.00%
Oil	6,405	7,028.27	9.73%	7,635.58	19.21%	7,633.31	19.18%
Imported electricity	5,489	7,038.17	28.22%	5,279.65	-3.82%	4,948.58	-9.85%
Total	**138,589**	**146,909.89**		**165,216.79**		**198,169.20**	

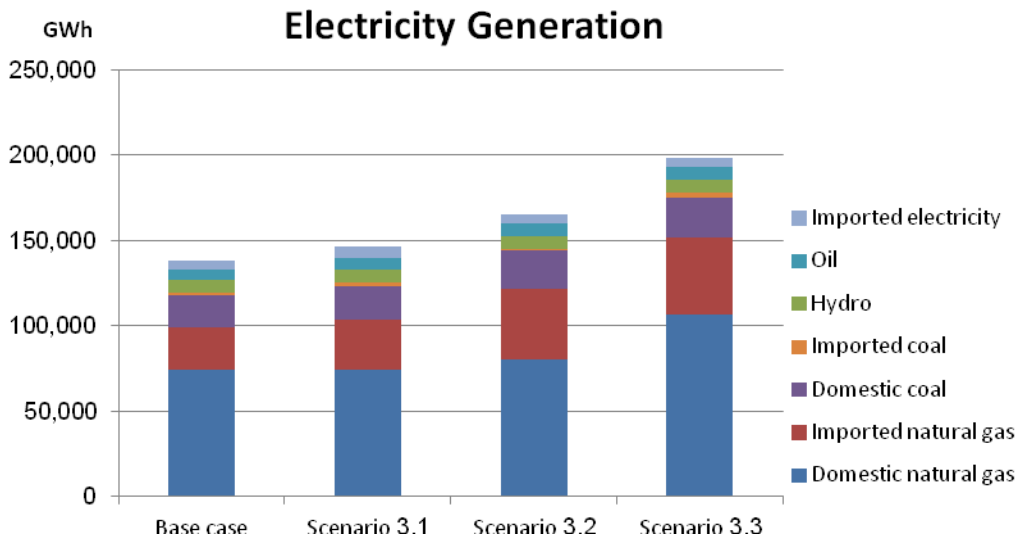

Figure 4.7: The Change of Electricity Generation Configurations in Response to an Increase in Investment and Local Electricity Consumption

Table 4.19: The Detailed Result of Power Generation (MWh/day) of an Increasing in Investment and Local Electricity Consumption

No.	Power plant	Symbol	Fuel	Baseline			Scenario 3.1			Scenario 3.2			Scenario 3.3		
				Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base	Peak	Intermed.	Base
1	Mae Moh	SN1	Domestic Coal	13298.9	25318	10885.1	14284.7	27205.9	11726.6	15750	31359.4	13578.1	15750	31500	15750
2	Bhumibol dam	SN2	Water	1000	0	0	1000	982.148	0	1000	939.897	0	0	829.2	0
3	Sirikit dam	SN3	Water	0	2000	0	0	1017.85	0	1060.1	0	0	1000	1170.8	0
4	Nam Phong 2	SN4	Domestic gas	3900	7800	3900	3700.6	7774.14	3887.07	3865.94	7731.89	3865.94	3540.6	7722.12	3861.06
5	Ubolratana dam	SN5	Water	151.2	0	0	151.2	0	0	151.2	0	0	151.2	0	0
6	Lam Takhong dam	SN6	Water	3000	3000	0	3000	3000	0	3000	3000	0	3000	3000	0
7	Chulabhorn dam	SN7	Water	240	288	0	240	288	0	240	288	0	240	288	0
8	Nam Pung dam	SN8	Water	36	21.6	0	36	21.6	0	36	21.6	0	36	21.6	0
9	Pak Mun dam	SN9	Water	816	816	0	816	816	0	816	816	0	816	816	0
10	Sirindhorn dam	SN10	Water	216	216	0	216	216	0	216	216	0	216	216	0
11	LanKrabeau	SN11	Domestic gas	1320.6	0	455	0	0	104.891	1313.43	0	126.017	0	0	130.899
12	Kaeng Koi 2	SN12	Domestic gas	3758.68	6561.15	2839.65	5438.68	10250	4519.65	3758.68	6685.57	4519.65	5438.68	10250	4519.65
13	Wang Noi	SN13	Domestic gas	0	0	0	0	0	0	0	0	0	3766.89	0	1160.63
14	National Power Supply	SN14	Imported coal	202.724	0	682.782	0	0	0	194.972	0	0	3240	0	0
15	Siam Energy	SN15	Domestic gas	5864.92	0	0	4225.53	0	0	6566.53	0	0	15000	17791.1	0
16	Bang Pakong	SN16	Domestic gas	15000	30000	12860.4	15000	30000	11933.8	15000	30000	13088.2	15000	30000	15000
17	Phan Thong	SN17	Domestic gas & Diesel	300	0	0	300	0	0	300	0	0	300	600	0
18	Kiridharn dam	SN18	Water	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0	76.8	92.16	0
19	BLCP	SN19	Imported coal	4241.76	0	0	0	0	0	0	0	0	5712.64	0	0
20	Rayong	SN20	Domestic gas	7049.94	10338.9	0	7049.94	4545.83	0	7049.94	13894.9	0	7049.94	14099.9	6215.5
21	IPP Dependent	SN21	Domestic gas	4200	8400	4200	4200	8400	4200	4200	8400	4200	4200	8400	4200
22	Bang Bo	SN22	Domestic gas	1026.46	4200	2100	0	4200	1273.63	0	0	0	4800	9600	4800
23	South Bangkok	SN23	Domestic gas	7473.54	19200	9600	12657.9	41884.6	20852.4	18720.8	38805.2	18704.4	21648	40021.1	22000
			Fuel oil	2126.46	0	0	4988.32	0	0	3279.22	0	0	352.044	0	0
24	NongJok	SN24	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
25	Ratchaburi Power	SN25	Imported gas	5146.84	16800	8400	2914	16800	8400	8400	5828	8400	8400	15195.6	8400
26	Ratchaburi Thermal	SN26	Imported gas	7153.16	16643.6	3900	20886	9800	3900	19600	41772	18528	17741.7	41772	15822.1
27	Srinagarin dam	SN27	Water	2000	1000	0	2000	1000	0	2000	1000	0	2000	1000	0
28	Vajiralongkorn dam	SN28	Water	800	400	0	800	400	0	800	400	0	800	400	0
29	ThaThung Na dam	SN29	Water	200	100	0	200	100	0	200	100	0	200	100	0
30	Tri Energy	SN30	Imported gas	4200	1556.45	4200	4200	8400	4200	8400	1072.01	0	4200	8400	4173.97
31	KaengKrachan dam	SN31	Water	114	136.8	0	114	136.8	0	114	136.8	0	114	136.8	0
32	Rajjaprabha dam	SN32	Water	1440	576	0	1440	576	0	1440	576	0	1440	576	0
33	Khanom	SN33	Domestic gas	0	0	0	1595.54	9327.14	3291.93	3873.54	9817.2	3576.38	4908.6	9817.2	3575.32
			&Fuel oil	3873.54	8500	3000	0	0	0	315.882	0	0	1890	312.878	0
34	Krabi	SN34	Fuel oil	0	0	0	0	0	0	0	0	0.00	0	0	0.00
35	Chana	SN35	Domestic gas	4166.68	8051.59	3679.65	4166.68	2732.27	2967.72	4166.68	1968.58	2683.27	1241.62	2082.28	2684.33
36	Bang Lang dam	SN36	Water	432	518.4	0	432	518.4	0	432	518.4	0	432	518.4	0
37	Suratthani	SN37	Diesel	0	0	0	0	0	0	0	0	0	0	0	0
38	TheunHinboun dam	SN38	Imported electricity	0	0	0	0	311.45	0	769.91	311.45	0.00	378.71	311.45	0
39	HouayHoa dam	SN39	Imported electricity	756	1512	756	756	1512	756	756	1512	756	756	1512	756
40	Nam Ngum dam	SN40	Imported electricity	900	1800	900	900	1800	472.51	900	1800	472.51	900	1800	472.51
41	Nam Leuk dam	SN41	Imported electricity	360	720	360	360	720	360	360	720	360	360	720	360
42	Malaysia	SN42	Imported electricity	0	0	0	0	0	0	0	0	0	0	0	0
43	North Bangkok	SN43	Domestic gas	4200	7196.44	4200	0	0	0	3939.6	0	0	4200	0	0
44	Nam Theun dam	SN44	Imported electricity	2037.66	2789.66	2106.36	1877.66	2478.21	1216.89	2012.3	2478.21	1216.89	1498.95	2478.21	1216.89

Table 4.20: The Fuel Cost Incurred from an Increasing in Investment and Local Electricity Consumption

Unit:Thai Baht/Day

Fuel Type	Fuel Cost			
	Base case	Scenario 3.1	Scenario 3.2	Scenario 3.3
Domestic Gas	227,207,100	234,080,300	244,060,900	323,963,900
Import Gas	48,540,010	56,748,980	79,948,250	88,589,340
Domestic Coal	13,250,870	14,245,380	16,245,040	16,864,080
Imported Coal	91,499,010	0	3,479,389	159,765,100
Hydro	204,716	204,716	204,716	204,716
Oil	3,429,590	3,674,815	4,063,697	4,160,046
Imported Electricity	31,182,660	27,785,660	29,866,130	27,785,660
Total	415,313,956	336,739,851	377,868,122	621,332,842

The detailed outcomes of fuel cost are displayed in Table 4.20. Strikingly, the costs of fuel in scenarios 2 and 3 are lower than in the baseline. The breakdown of fuel costs in scenarios 2 and 3 shows that the cost of imported coal drops substantially. This phenomenon occurs owing to an effect of natural gas-based Siam Energy power plant upgrading. As consequence, the generation system shifts from costly imported coal to domestic natural gas. However, these reductions in fuel cost do not include the power plant upgrading cost which is difficult to determine.

Electricity consumption and the growth of an economy usually move in tandem. This phenomenon is confirmed by the outcome of this case study. All macroeconomic variables show improvements as a result of higher volumes of electricity demand. The results show that Real GDP (RGDP) grows by 0.15%, 0.37%, and 0.52% when local electricity demand increases by 10%, 20%, and 30% and national investment rises by 2%, 5%, and 7% respectively. However, the levels of prices of goods and services also exhibit an upward trend which is represented in a small inflation of the Price Index (PINDEX). The numerical results for macroeconomics variables are shown in Table 4.21 as well as the graphical representation in Figure 4.8.

Table 4.21: Responses of Macroeconomic and Socio-economic Variables to an Increase in Investment and Local Electricity Consumption

Variable	Baseline	Scenario 3.1	%Change	Scenario 3.2	%Change	Scenario 3.3	%Change
Macroeconomics variables							
RGDP	7,464.27	7,475.60	0.15%	7,492.06	0.37%	7,502.82	0.52%
GDP	7,464.27	7,491.88	0.37%	7,532.99	0.92%	7,561.00	1.30%
Price Index	1.00	1.002179	0.22%	1.005463	0.55%	1.007755	0.78%
Socioeconomics variables							
Income of the poor	1,523.92	1,527.93	0.26%	1,533.88	0.65%	1,537.91	0.92%
Income of the non-poor	3,914.67	3,919.53	0.12%	3,926.77	0.31%	3,931.66	0.43%
Income distribution	0.3893	0.3898	0.14%	0.3906	0.34%	0.3912	0.48%
Unemployment rate	15.00%	14.75%	-1.69%	14.38%	-4.13%	14.15%	-5.67%

Table 4.22: The Five Sectors Whose Output Increases Most as a Consequence of an Increase in Investment and Local Electricity Consumption

Sector	Description	Basecase	Scenario 3.1	% change	Scenario 3.2	% change	Scenario 3.3	% change
SEC55	Construction	601.567	612.959	1.894%	630.049	4.735%	641.458	6.631%
SEC49	Other Transportation Equipment	80.479	81.523	1.297%	83.085	3.238%	84.124	4.529%
SEC40	Cement and Concrete Products	161.104	163.170	1.283%	166.234	3.185%	168.239	4.429%
SEC22	Metal Ore and Non-Metal Ore	51.367	51.815	0.872%	52.478	2.163%	52.911	3.005%
SEC41	Other Non-metallic Products	121.501	122.489	0.814%	123.967	2.030%	124.949	2.838%

Table 4.22 presents impacts on the five sectors that benefit most from policy examined in this case study. The Construction sector always beats other sectors. From the outcomes it can be seen that almost all of the top five sectors are construction and raw material producers. The complete results of sectoral output are provided in Table 4.23.

Heavier utilization of electricity also brings favorable impact to the socio-economic indicators. Overall, household income is higher than in the baseline as shown in Table 4.21. A graphical representation of socio-economic variables is shown in Figure 4.9. With increasing power consumption, income of both poor households non-poor households increases. The result also reveals that the rate of change of

income of the poor households always exceeds that of the rich. As a consequence, the gap of income distribution between the poor and non-poor households is slightly widened. In the labor market, the unemployment rates reduce due to increased business activity.

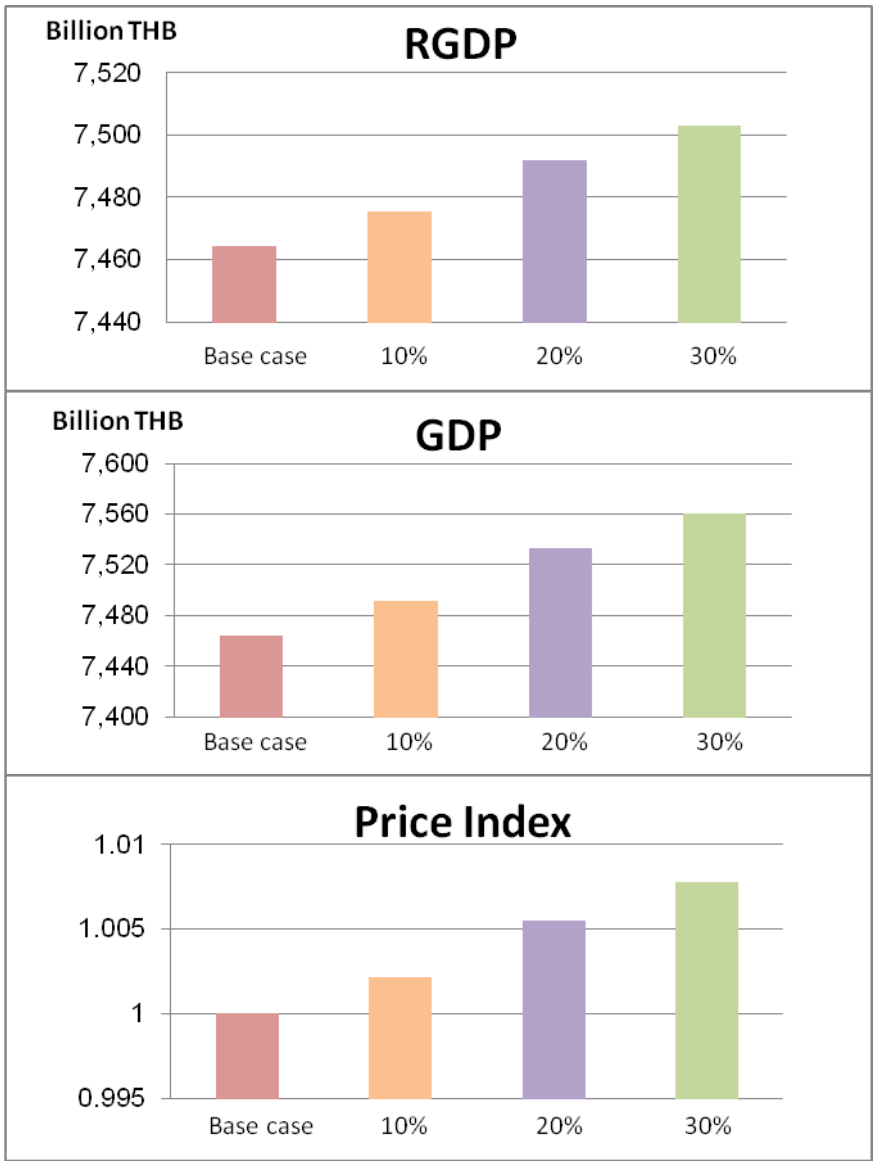

Figure 4.8: The Change of Macroeconomic Variables compared to the Baseline Responded to an Increasing in Investment and Local Electricity Consumption

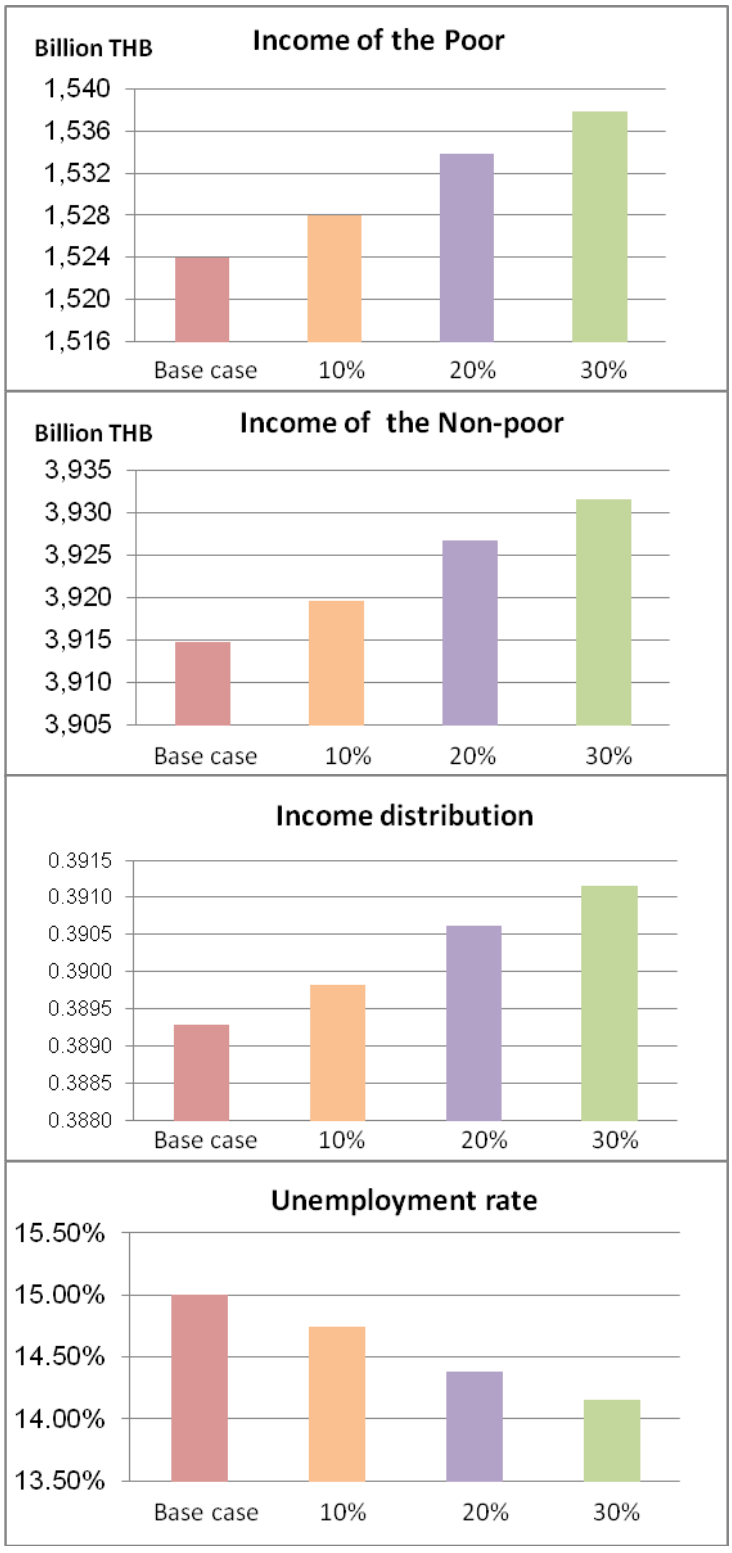

Figure 4.9: The Change of Macroeconomic Variables compared to the Baseline Responded to an Increasing in Investment and Local Electricity Consumption

Table 4.23: The Complete Result of the Change in Sectoral Output as a Consequence of an Increasing in Investment and Local Electricity Consumption

Sector	Description	Basecase	Scenario 3.1	% change	Scenario 3.2	% change	Scenario 3.3	% change
SEC1	Agriculture	835.007	836.297	0.154%	838.205	0.383%	839.459	0.533%
SEC2	Maize	16.742	16.862	0.712%	17.040	1.781%	17.159	2.492%
SEC3	Casava	30.818	30.980	0.527%	31.224	1.316%	31.386	1.843%
SEC4	Sugarcane	32.873	32.895	0.065%	32.925	0.158%	32.943	0.211%
SEC5	Sugar Refinery	74.377	74.398	0.029%	74.427	0.068%	74.444	0.090%
SEC6	Ethanol	1.623	1.623	0.001%	1.623	-0.002%	1.623	-0.014%
SEC7	Coal	19.218	19.346	0.666%	19.530	1.622%	19.705	2.531%
SEC8	Crude oil	225.220	226.276	0.469%	227.849	1.167%	228.892	1.630%
SEC9	Natural gas (raw)	52.369	52.468	-0.226%	52.056	-0.599%	52.019	-0.669%
SEC10	Condensate	27.753	27.804	0.181%	27.879	0.453%	27.929	0.634%
SEC11	Pre-gasoline	42.559	42.608	0.115%	42.681	0.286%	42.730	0.402%
SEC12	Reg-gasoline	100.825	101.091	0.264%	101.487	0.657%	101.749	0.916%
SEC13	Exx (Gasohol)	4.021	4.036	0.380%	4.059	0.944%	4.074	1.320%
SEC14	Aviation fuel and kerosene	71.700	71.986	0.399%	72.412	0.993%	72.695	1.388%
SEC15	Diesel	336.897	337.877	0.291%	339.336	0.724%	340.307	1.012%
SEC16	Bxx (Diesel-Bio mix)	4.983	5.000	0.342%	5.026	0.851%	5.043	1.188%
SEC17	Fuel oil	48.884	48.961	0.158%	49.076	0.393%	49.154	0.553%
SEC18	Natural gas (separated)	101.303	101.358	0.054%	101.419	0.114%	101.564	0.258%
SEC19	Electricity (Non-renew)	585.314	585.619	0.052%	585.803	0.084%	587.542	0.381%
SEC20	Electricity (Renewable)	175.798	175.987	0.107%	176.265	0.265%	176.443	0.367%
SEC21	Transportation and Communication	1,194.624	1,200.064	0.455%	1,208.174	1.134%	1,213.544	1.584%
SEC22	Metal Ore and Non-Metal Ore	51.367	51.815	0.872%	52.478	2.163%	52.911	3.005%
SEC23	Slaughtering	144.927	145.076	0.103%	145.293	0.253%	145.433	0.349%
SEC24	Processing and Preserving of Foods	444.645	445.430	0.177%	446.609	0.442%	447.406	0.621%
SEC25	Rice and Other Grain Milling	292.040	292.607	0.194%	293.452	0.484%	294.015	0.676%
SEC26	Other Foods	147.066	147.294	0.155%	147.634	0.387%	147.862	0.542%
SEC27	Animal Food	57.156	57.159	0.006%	57.162	0.011%	57.161	0.008%
SEC28	Beverages	289.827	290.662	0.288%	291.908	0.718%	292.739	1.005%
SEC29	Tobacco Processing and Products	24.773	24.832	0.239%	24.921	0.595%	24.980	0.834%
SEC30	Spinning and Weaving	338.986	339.361	0.111%	339.920	0.275%	340.280	0.382%
SEC31	Textile Bleaching, Made-up, Knitting	116.101	116.291	0.164%	116.576	0.409%	116.766	0.573%
SEC32	Wearing Apparels, Carpets and Cordage	411.129	411.840	0.173%	412.900	0.431%	413.610	0.604%
SEC33	Paper and Paper Products	153.920	154.195	0.179%	154.608	0.447%	154.884	0.627%
SEC34	Printing and Publishing	56.774	56.893	0.210%	57.071	0.524%	57.191	0.734%
SEC35	Basic Chemical Products	384.842	385.761	0.239%	387.141	0.597%	388.093	0.845%
SEC36	Fertilizer and Pesticides	21.074	21.180	0.504%	21.340	1.260%	21.448	1.774%
SEC37	Other Chemical Products	208.450	209.072	0.298%	210.005	0.746%	210.634	1.048%
SEC38	Rubber Products	194.816	194.918	0.052%	195.071	0.131%	195.171	0.182%
SEC39	Plastic Wares	150.000	150.239	0.159%	150.598	0.399%	150.846	0.564%
SEC40	Cement and Concrete Products	161.104	163.170	1.283%	166.234	3.185%	168.239	4.429%
SEC41	Other Non-metallic Products	121.501	122.489	0.814%	123.967	2.030%	124.949	2.838%
SEC42	Iron and Steel	144.077	145.114	0.720%	146.673	1.802%	147.727	2.534%
SEC43	Non-ferrous Metal	48.990	49.046	0.115%	49.130	0.285%	49.186	0.399%
SEC44	Fabricated Metal Products	219.378	221.106	0.787%	223.702	1.971%	225.453	2.769%
SEC45	Industrial Machinery	196.079	197.321	0.633%	199.178	1.581%	200.419	2.213%
SEC46	Computers and parts	408.447	408.597	0.037%	408.824	0.092%	408.975	0.129%
SEC47	Electrical Machinery and Apparatus	953.042	953.394	0.037%	953.923	0.092%	954.277	0.130%
SEC48	Motor Vehicles and Repairing	716.133	719.173	0.424%	723.734	1.061%	726.765	1.485%
SEC49	Other Transportation Equipment	80.479	81.523	1.297%	83.085	3.238%	84.124	4.529%
SEC50	Leather Products	175.378	175.595	0.124%	175.918	0.308%	176.134	0.431%
SEC51	Saw Mills and Wood Products	111.164	111.412	0.223%	111.785	0.558%	112.034	0.783%
SEC52	Jewelry & Related Articles	299.810	299.937	0.042%	300.125	0.105%	300.246	0.146%
SEC53	Other Manufacturing Products	223.378	224.217	0.376%	225.472	0.938%	226.314	1.315%
SEC54	Other Public Utilities	31.875	31.900	0.077%	31.936	0.190%	31.959	0.263%
SEC55	Construction	601.567	612.959	1.894%	630.049	4.735%	641.458	6.631%
SEC56	Trade	2,140.196	2,148.944	0.409%	2,162.010	1.019%	2,170.783	1.429%
SEC57	Services	2,681.730	2,690.248	0.318%	2,702.944	0.791%	2,711.415	1.107%
SEC58	Unclassified	257.666	258.067	0.155%	258.666	0.388%	259.078	0.548%

In conclusion, in this case, the interaction of labor and goods markets responded positively. The mechanism basically starts from an investment and an increasing demand for power mostly in the manufacturing clusters. This subsequently attracts new labor force and increases the income of the current workforce.

Regarding policy makers and planners, this case study suggests an alternative way to understand the effects of future increases in power consumption. An alternative of upgrading two power plants, i.e., South Bangkok and Siam Energy power stations, is recommended to meet increasing demand for power in the Bangkok metropolitan area, the Northern part of the Central region, and the Eastern region. Whereas, the Eastern region seems to be well-prepared for a surge in power demand, as the simulation outcome shows no power shortages in any scenarios. In short term, the manufacturing factories in these regions should consider lower demand of electricity by implementing Demand Side Management (DSM) to shift their production process to power off-peak hours or even install solar cell to provide additional power during the daytime.

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CHAPTER5

FINAL REMARKS

5.1 Conclusion

This dissertation has investigated potential consequences of changes in the structure of the electricity sector of the Thai economy. Instead of employing a Computable general Equilibrium (CGE) model alone, the study has also made use of an extended module of real electricity generation and transmission. The CGE model and the extended module are integrated by using the approach simply called "Top-down and Bottom-up," which allows the policy makers, planners, and scholars to observe the adjustments of economies and true power generation simultaneously. For energy economics researchers, this type of hybrid model is one of the premier research tools because it integrates depictions of both real power production at the individual plant level and the wider network of electricity transmission with a depiction of the workings of the macro-economy. At the time of this writing, such a hybrid model had yet to be developed and applied in the case of the Thai economy.

Three counterfactual cases which have high possibilities of occurring have been investigated by simulation and the results of the each simulation have been analyzed. The 3 cases are: (1) The imported natural gas shortage, (2) The different input compositions for electricity generation, and (3) An increase in investment and local demand of electricity. Of these 3 cases, the first case is the most likely to appear in the near term and have the least effect on the economy, while the other two cases would be expected to materialize and adjust over the long run. The sensitivity analysis

of different levels of imported gas disruption and rising local power demand have been provided for cases 1 and 3.

The hybrid model has been calibrated from both economic and engineering data prior to its use in conducting simulations. Three macroeconomic variables were chosen to use as indicators to compare simulation results with those obtained in a baseline solution: (1) Gross Domestic Production (GDP), (2) Exchange Rate (EXR), and (3) Government Revenue (INC_{gin}). As is the case in Thailand, power is generated from 7 types of fuel in the hybrid model: Domestic natural gas, Imported natural gas, Domestic coal, Imported coal, Hydro, Oil, and Imported electricity.

For the first case considered, the result reveals that disruption of imported gas causes sudden power outages and has detrimental economic and socio-economic effects. It is estimated that entire depletion of imported gas would lead to a reduction of 17% of total generation and the Bangkok metropolitan area would bear the most critical consequences. Imported natural gas storage is not recommended because of its high construction cost. Rather, it is proposed that additional fuel costs be offset by collecting penalty fees from the supplier-Myanmar in the case of failure to deliver contracted natural gas. The result further presents that income distribution and unemployment rate are decline due to power loss.

In the second case, in which alternative portfolios of fuel stocks are considered, the simulation results obtained suggest that increasing the used of hydro power and domestic gas in power production is desirable. Heavier use of hydro power significantly lowers the cost of fuel for power generation. However, the intensive use of hydro power still needs further study because of its potential environmental

impacts. On the other hand, the outcome reveals that promotion of domestic gas-based power could stimulate higher Real Gross Domestic Product (RGDP) and dampen inflation (PINDEX). Socio-economic impacts are also favorable as income distribution and unemployment rate are likely to improve due to the upward trend of domestic energy-related activities.

In the last case study, the effects of the increasing local electricity demand due to the AEC's onset are examined. Three intense businesses and industrial locations: (1) Bangkok metropolitan area (DMEA), (2) Northern part of the central (DC1), and (3) East region (DC2), are selected to be the representatives of country's high growth engine area. The demand of electricity is varied by increments of 10%, 20%, and 30% from the baseline and national investment is increased by 2%, 5%, and 7% to provide the productive capacity to meet anticipated demand for traded goods. Simulation results suggest that, with respect to power generation, domestic and imported gas-based power are the two prime resources that can offset the rising power requirement. In addition, two power plants: South Bangkok and Siam Energy natural gas-based power stations are recommended for upgrade due to their significant capacities and positions in the national network of power generation and distribution. In terms of economic impacts, growth of RGDP is seen to consistently follow increasing electricity consumption. In the scenario with the largest increment of additional power demand, 30%, a 0.5% increase in RGDP is indicated. However, the result reveals the existence of a trade-off in economic and socio-economic indicators since the income distribution and unemployment rate are worse when power demand increases.

Therefore, the policy makers should be mindful of this trade-off and examine it further.

In conclusion, this study has employed a CGE framework integrated with an electricity network submodule to investigate linkages between the electricity sector, the macro-economy, and socio-economic conditions.. The results of three interested cases show how changes in the structure of the electricity sector can affect the Thai economy. In this study, the relationship is quite straightforward. The economic condition can be improved by the intensive used of electricity as well as by the structure of fuel portfolios but perhaps not the other way round.

5.2 Possibilities for Future Research

The research reported in this dissertation has been conducted with a CGE framework integrated with an electricity network submodule. This hybrid model demonstrates the complementary relationships of real power generation and the workings of the Thai economy. As in the case of other economic models, this model itself possesses certain analytical capabilities and still requires further improvement. A future study should consider following subjects.

Regarding CGE model, first, data of Social Accounting Matrix (SAM) of the year 2006 have been is used in this study. The SAM's feature of separated domestic and import intermediate goods is suitable for this analysis of interested electricity issue. However, the data itself are not very recent and should be updated before being used in future studies. Second, the parameters of the CGE model, such as elasticities of substitution and transformation and share parameters, that have been used in this

analysis have been obtained from published literatures; they should be reevaluated to make the model more precise. Finally, the sectoral investments are assumed to be proportionally related to total investment. To become more realistic, further research should evaluate sectoral investments with non-linear relationships to aggregate investment.

As regards the sub-module network model, the detailed data of electricity consumption are quite limited to the regional level. Once the data of provincial level and the detail power transmission network are available, the model could be much improved. In this sub-module, some parameters such as the plant efficiency and fuels heat content, have been obtained from previous studies. To gain more accuracy, the sub-module network model should be fined-tuned by adjusting the individual plant efficiency parameters and heat content data by fuel type at each location. Lastly, this study has been conducted from a planning perspective. Consequently, the transmission system has been developed on a loss-free basis and so does not capture much on the engineering end. To reflect characteristic of electricity system behavior more realistically, more power system engineering concepts should be applied in future work.

APPENDIX A

Description of 192 Sectors in Social Accounting Matrix of Thailand in 2006

Factors of production

FACT1	Labor
FACT2	Capital

Production sectors

SEC1	Agriculture
SEC2	Maize
SEC3	Casava
SEC4	Sugarcane
SEC5	Sugar Refinery
SEC6	Ethanol
SEC7	Coal
SEC8	Crude oil
SEC9	Natural gas (raw)
SEC10	Condensate
SEC11	Pre-gasoline
SEC12	Reg-gasoline
SEC13	Exx (Gasohol)
SEC14	Aviation fuel and kerosene
SEC15	Diesel
SEC16	Bxx (Diesel-Bio mix)
SEC17	Fuel oil
SEC18	Natural gas (separated)

SEC19	Electricity (Non-renew)
SEC20	Electricity (Renewable)
SEC21	Transportation and Communication
SEC22	Metal Ore and Non-Metal Ore
SEC23	Slaughtering
SEC24	Processing and Preserving of Foods
SEC25	Rice and Other Grain Milling
SEC26	Other Foods
SEC27	Animal Food
SEC28	Beverages
SEC29	Tobacco Processing and Products
SEC30	Spinning and Weaving
SEC31	Textile Bleaching, Made-up, Knitting
SEC32	Wearing Apparels, Carpets and Cordage
SEC33	Paper and Paper Products
SEC34	Printing and Publishing
SEC35	Basic Chemical Products
SEC36	Fertilizer and Pesticides
SEC37	Other Chemical Products
SEC38	Rubber Products
SEC39	Plastic Wares
SEC40	Cement and Concrete Products
SEC41	Other Non-metallic Products
SEC42	Iron and Steel
SEC43	Non-ferrous Metal
SEC44	Fabricated Metal Products

SEC45	Industrial Machinery
SEC46	Computers and parts
SEC47	Electrical Machinery and Apparatus
SEC48	Motor Vehicles and Repairing
SEC49	Other Transportation Equipment
SEC50	Leather Products
SEC51	Saw Mills and Wood Products
SEC52	Jewelry & Related Articles
SEC53	Other Manufacturing Products
SEC54	Other Public Utilities
SEC55	Construction
SEC56	Trade
SEC57	Services
SEC58	Unclassified

Domestic intermediate inputs

COM_D1	Agriculture
COM_D2	Maize
COM_D3	Casava
COM_D4	Sugarcane
COM_D5	Sugar Refinery
COM_D6	Ethanol
COM_D7	Coal
COM_D8	Crude oil
COM_D9	Natural gas (raw)
COM_D10	Condensate

COM_D11	Pre-gasoline
COM_D12	Reg-gasoline
COM_D13	Exx (Gasohol)
COM_D14	Aviation fuel and kerosene
COM_D15	Diesel
COM_D16	Bxx (Diesel-Bio mix)
COM_D17	Fuel oil
COM_D18	Natural gas (separated)
COM_D19	Electricity (Non-renew)
COM_D20	Electricity (Renewable)
COM_D21	Transportation and Communication
COM_D22	Metal Ore and Non-Metal Ore
COM_D23	Slaughtering
COM_D24	Processing and Preserving of Foods
COM_D25	Rice and Other Grain Milling
COM_D26	Other Foods
COM_D27	Animal Food
COM_D28	Beverages
COM_D29	Tobacco Processing and Products
COM_D30	Spinning and Weaving
COM_D31	Textile Bleaching, Made-up, Knitting
COM_D32	Wearing Apparels, Carpets and Cordage
COM_D33	Paper and Paper Products
COM_D34	Printing and Publishing
COM_D35	Basic Chemical Products
COM_D36	Fertilizer and Pesticides

COM_D37 Other Chemical Products

COM_D38 Rubber Products

COM_D39 Plastic Wares

COM_D40 Cement and Concrete Products

COM_D41 Other Non-metallic Products

COM_D42 Iron and Steel

COM_D43 Non-ferrous Metal

COM_D44 Fabricated Metal Products

COM_D45 Industrial Machinery

COM_D46 Computers and parts

COM_D47 Electrical Machinery and Apparatus

COM_D48 Motor Vehicles and Repairing

COM_D49 Other Transportation Equipment

COM_D50 Leather Products

COM_D51 Saw Mills and Wood Products

COM_D52 Jewelry & Related Articles

COM_D53 Other Manufacturing Products

COM_D54 Other Public Utilities

COM_D55 Construction

COM_D56 Trade

COM_D57 Services

COM_D58 Unclassified

Foreign (Imported) intermediate inputs

COM_F1 Agriculture

COM_F2 Maize

COM_F3	Casava
COM_F4	Sugarcane
COM_F5	Sugar Refinery
COM_F6	Ethanol
COM_F7	Coal
COM_F8	Crude oil
COM_F9	Natural gas (raw)
COM_F10	Condensate
COM_F11	Pre-gasoline
COM_F12	Reg-gasoline
COM_F13	Exx (Gasohol)
COM_F14	Aviation fuel and kerosene
COM_F15	Diesel
COM_F16	Bxx (Diesel-Bio mix)
COM_F17	Fuel oil
COM_F18	Natural gas (separated)
COM_F19	Electricity (Non-renew)
COM_F20	Electricity (Renewable)
COM_F21	Transportation and Communication
COM_F22	Metal Ore and Non-Metal Ore
COM_F23	Slaughtering
COM_F24	Processing and Preserving of Foods
COM_F25	Rice and Other Grain Milling
COM_F26	Other Foods
COM_F27	Animal Food
COM_F28	Beverages

COM_F29	Tobacco Processing and Products
COM_F30	Spinning and Weaving
COM_F31	Textile Bleaching, Made-up, Knitting
COM_F32	Wearing Apparels, Carpets and Cordage
COM_F33	Paper and Paper Products
COM_F34	Printing and Publishing
COM_F35	Basic Chemical Products
COM_F36	Fertilizer and Pesticides
COM_F37	Other Chemical Products
COM_F38	Rubber Products
COM_F39	Plastic Wares
COM_F40	Cement and Concrete Products
COM_F41	Other Non-metallic Products
COM_F42	Iron and Steel
COM_F43	Non-ferrous Metal
COM_F44	Fabricated Metal Products
COM_F45	Industrial Machinery
COM_F46	Computers and parts
COM_F47	Electrical Machinery and Apparatus
COM_F48	Motor Vehicles and Repairing
COM_F49	Other Transportation Equipment
COM_F50	Leather Products
COM_F51	Saw Mills and Wood Products
COM_F52	Jewelry & Related Articles
COM_F53	Other Manufacturing Products
COM_F54	Other Public Utilities

COM_F55	Construction
COM_F56	Trade
COM_F57	Services
COM_F58	Unclassified

Taxes and others transferred payments

TTM1	Trade and transport margin
DIRTAX1	Direct tax
VAT1	Value-added tax
EXCSTAX1	Excise tax
TARIFF1	Tariff
OINDTAX1	Other indirect tax
SUBY1	Subsidy

Institutions

HHH1	Household 1
HHH2	Household 2
HHH3	Household 3
HHH4	Household 4
HHH5	Household 5
GOV1	Government
POE1	Private and State-owned Enterprise
ROW1	Rest of the world

Capital accounts

KA	Capital account

APPENDIX B

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	FACT1	FACT2	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	SEC8	SEC9	SEC10
FACT1	0	0	81331.43	3954.11	3981.89	5566.82	4859.88	514.55	2495.14	34882.19	23641.87	12394
FACT2	0	0	46285.49	5817.66	13882.89	13721.00	17998.93	327.86	8917.45	17714.73	7849.56	4586.12
SEC1	0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	0	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	0	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	0	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	0	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	0	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	0	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	0	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	0	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	0	0	0
SEC11	0	0	0	0	0	0	0	0	0	0	0	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	0
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC11	SEC12	SEC13	SEC14	SEC15	SEC16	SEC17	SEC18	SEC19	SEC20	SEC21	SEC22
FACT1	313.16	3775.56	211.82	743.92	2768.39	252.73	425.84	13989.34	32313.42	33587.67	154153.1	5924.47
FACT2	651.37	5341.57	1521.57	4853.56	48267.67	133.78	8132.11	8298.36	91186.27	79115.62	263535.3	28647.42
SEC1	0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	0	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	0	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	0	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	0	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	0	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	0	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	0	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	0	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	0	0	0
SEC11	0	0	0	0	0	0	0	0	0	0	0	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	0
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC23	SEC24	SEC25	SEC26	SEC27	SEC28	SEC29	SEC30	SEC31	SEC32	SEC33	SEC34
FACT1	9818.98	33982.84	1894.92	16272.38	7289.47	45292.75	3168.57	44512.18	2125.27	54837.22	15548.78	5572.53
FACT2	13726.66	68785.65	36248.58	33315.86	1816.56	112113.5	6448.79	71732.65	25949.40	86214.66	28845.92	13383.55
SEC1	0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	0	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	0	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	0	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	0	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	0	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	0	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	0	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	0	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	0	0	0
SEC11	0	0	0	0	0	0	0	0.0	0	0	0	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	0
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

Sector	SEC35	SEC36	SEC37	SEC38	SEC39	SEC40	SEC41	SEC42	SEC43	SEC44	SEC45	SEC46
FACT1	23793.78	1424.17	18842.78	25461.92	14383.50	25426.95	12172.48	21799.19	11544.85	22547.66	16596.74	29117.86
FACT2	67235.50	2155.69	39171.25	45146.15	21186.75	57556.42	31413.59	32832.20	25537.26	46761.42	45412.58	59739.76
SEC1	0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	0	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	0	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	0	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	0	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	0	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	0	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	0	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	0	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	0	0	0
SEC11	0	0	0	0	0	0	0	0	0	0	0	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	0
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

(in millions of Baht)

Sector	SEC47	SEC48	SEC49	SEC50	SEC51	SEC52	SEC53	SEC54	SEC55	SEC56	SEC57	SEC58
FACT1	67939.87	48643.15	8381.15	26768.93	18838.62	3375.57	23774.60	6867.84	55752.70	385377.5	92789.84	15382.99
FACT2	139392.8	124841.7	16293.39	52462.29	27858.76	74245.13	45517.75	15245.42	114426.8	727515.6	659565.7	48614.92
SEC1	0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	0	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	0	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	0	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	0	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	0	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	0	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	0	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	0	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	0	0	0
SEC11	0	0	0	0	0	0	0	0	0	0	0	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	0
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D1	COM_D2	COM_D3	COM_D4	COM_D5	COM_D6	COM_D7	COM_D8	COM_D9	COM_D10	COM_D11	COM_D12
FACT1	0	0	0	0	0	0	0	0	0	0	0	0
FACT2	0	0	0	0	0	0	0	0	0	0	0	0
SEC1	835780.0	0	0	0	0	0	0	0	0	0	0	0
SEC2	0	16742.28	0	0	0	0	0	0	0	0	0	0
SEC3	0	0	3817.87	0	0	0	0	0	0	0	0	0
SEC4	0	0	0	32873.34	0	0	0	0	0	0	0	0
SEC5	0	0	0	0	74376.53	0	0	0	0	0	0	0
SEC6	0	0	0	0	0	1623.227	0	0	0	0	0	0
SEC7	0	0	0	0	0	0	19218.2	0	0	0	0	0
SEC8	0	0	0	0	0	0	0	225219.9	0	0	0	0
SEC9	0	0	0	0	0	0	0	0	52369.13	0	0	0
SEC10	0	0	0	0	0	0	0	0	0	27753.41	0	0
SEC11	0	0	0	0	0	0	0	0	0	0	42558.95	0
SEC12	0	0	0	0	0	0	0	0	0	0	0	1824.716
SEC13	0	0	0	0	0	0	0	0	0	0	0	0
SEC14	0	0	0	0	0	0	0	0	0	0	0	0
SEC15	0	0	0	0	0	0	0	0	0	0	0	0
SEC16	0	0	0	0	0	0	0	0	0	0	0	0
SEC17	0	0	0	0	0	0	0	0	0	0	0	0
SEC18	0	0	0	0	0	0	0	0	0	0	0	0
SEC19	0	0	0	0	0	0	0	0	0	0	0	0
SEC20	0	0	0	0	0	0	0	0	0	0	0	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D13	COM_D14	COM_D15	COM_D16	COM_D17	COM_D18	COM_D19	COM_D20	COM_D21	COM_D22	COM_D23	COM_D24
FACT1	0	0	0	0	0	0	0	0	0	0	0	39813.97
FACT2	0	0	0	0	0	0	0	0	0	0	0	41677.57
SEC1	0	0	0	0	0	0	0	0	0	0	0	24466.54
SEC2	0	0	0	0	0	0	0	0	0	0	0	496.96
SEC3	0	0	0	0	0	0	0	0	0	0	0	941.83
SEC4	0	0	0	0	0	0	0	0	0	0	0	1336.31
SEC5	0	0	0	0	0	0	0	0	0	0	0	2441.78
SEC6	0	0	0	0	0	0	0	0	0	0	0	539.85
SEC7	0	0	0	0	0	0	0	0	0	0	0	654.97
SEC8	0	0	0	0	0	0	0	0	0	0	0	7875.75
SEC9	0	0	0	0	0	0	0	0	0	0	0	1877.48
SEC10	0	0	0	0	0	0	0	0	0	0	0	1194.46
SEC11	0	0	0	0	0	0	0	0	0	0	0	1686.83
SEC12	0	0	0	0	0	0	0	0	0	0	0	3881.29
SEC13	4285.463	0	0	0	0	0	0	0	0	0	0	158.33
SEC14	0	71699.87	0	0	0	0	0	0	0	0	0	2886.54
SEC15	0	0	336897.4	0	0	0	0	0	0	0	0	13861.49
SEC16	0	0	0	4983.43	0	0	0	0	0	0	0	294.13
SEC17	0	0	0	0	48883.66	0	0	0	0	0	0	2972.72
SEC18	0	0	0	0	0	11333.49	0	0	0	0	0	4435.56
SEC19	0	0	0	0	0	0	585314.3	0	0	0	0	26143.93
SEC20	0	0	0	0	0	0	0	175798.2	0	0	0	8726.44
SEC21	0	0	0	0	0	0	0	0	1194624	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	51367.29	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	144926.9	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	444644.7
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D25	COM_D26	COM_D27	COM_D28	COM_D29	COM_D30	COM_D31	COM_D32	COM_D33	COM_D34	COM_D35	COM_D36
FACT1	4487.16	4271.24	4516.73	4732.16	4962.41	41192.82	41423.23	41653.62	41884.27	42114.43	42344.83	42575.24
FACT2	41463.18	41248.78	41343.91	4820.00	4656.49	4391.21	4176.82	39962.42	39748.32	39533.64	39319.25	39148.52
SEC1	24379.66	24712.67	25456.77	25378.68	25711.69	26447.00	26377.77	26717.16	27437.23	27376.73	27797.38	28427.45
SEC2	539.34	519.62	518.00	525.19	532.48	539.76	546.14	553.13	561.70	567.19	574.22	581.25
SEC3	955.42	969.16	982.59	996.17	1975.39	1233.38	1369.22	1556.30	1649.43	1776.75	1912.59	1148.43
SEC4	1488.12	1639.92	1791.72	1943.52	1195.32	1124.71	1139.89	1155.73	1172.53	1185.43	1261.33	1215.79
SEC5	2448.47	2475.99	2511.90	2547.84	2583.72	2619.62	2655.52	2691.44	2727.34	2763.24	2799.15	2835.57
SEC6	547.19	555.36	563.54	571.72	579.89	588.71	596.25	644.25	612.63	627.80	628.96	637.13
SEC7	665.47	675.12	685.20	695.27	753.51	715.43	725.52	735.58	745.65	755.73	765.85	775.89
SEC8	7998.66	8121.57	8244.48	8367.39	8493	8613.21	8736.12	8859.32	8981.94	9148.54	9227.76	9356.75
SEC9	1971.50	1936.83	1966.58	1996.19	2258.66	2555.45	2852.24	2114.93	2144.58	2174.27	2239.40	2233.62
SEC10	1357.58	1526.88	1683.80	1846.92	1112.22	1117.31	1133.62	1149.94	1166.25	1182.56	1198.87	1215.18
SEC11	1626.71	1652.62	1678.52	1744.35	1733.36	1756.24	1782.15	1885.41	1833.97	1859.87	1885.77	1911.68
SEC12	3944.79	4826.97	4717.59	4135.25	4198.74	4262.23	4325.71	4389.23	4452.69	4516.18	4579.67	4643.16
SEC13	169.46	163.56	166.18	168.79	171.42	174.27	176.64	179.26	181.88	184.49	187.19	189.73
SEC14	2934.70	2982.85	3311.35	3791.73	3127.33	3175.50	3223.65	3271.89	3319.97	3368.13	3416.29	3464.45
SEC15	14933.72	14326.73	14568.73	14793.44	15268.18	15261.59	15493.52	15726.87	15962.31	16193.59	16426.95	16663.36
SEC16	212.97	216.53	228.20	223.64	227.19	237.51	234.38	237.86	241.43	244.98	248.53	253.00
SEC17	2133.18	2169.96	2258.89	2249.23	2276.83	2312.74	2348.66	2384.57	2424.81	2456.39	2492.36	2528.22
SEC18	4512.15	4588.65	4665.22	4741.75	4818.30	4894.85	4971.40	5479.45	5124.49	5214.92	5277.59	5354.14
SEC19	26598.50	27536.53	27576.35	27962.26	28416.78	28871.35	29325.92	29784.86	3235.56	3689.63	31144.20	31598.77
SEC20	8147.48	8287.73	8427.92	8568.14	8783.61	8848.59	8988.86	9129.19	9269.24	9494.58	9549.68	9689.90
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	292446.8	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	147655.6	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	57155.92	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	289826.6	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	24773	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	338986.3	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	116113.4	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	411128.6	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	153919.5	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	56773.91	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	384841.7	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	21742.84
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D37	COM_D38	COM_D39	COM_D40	COM_D41	COM_D42	COM_D43	COM_D44	COM_D45	COM_D46	COM_D47	COM_D48
FACT1	42856.44	43364.37	43266.45	43496.85	43727.25	43957.66	44188.62	44418.46	44648.87	44879.28	45196.73	45347.67
FACT2	38894.58	38676.65	38461.67	38247.28	38328.85	37818.49	37649.86	37389.75	37175.31	36969.19	36746.53	36532.13
SEC1	28375.75	28787.67	29417.68	29374.78	29777.83	3479.18	3373.80	3768.63	31398.14	31372.82	31758.30	32388.37
SEC2	588.27	595.33	623.31	693.60	616.39	623.42	634.45	637.47	644.51	651.53	658.56	665.59
SEC3	1118.43	1132.12	1145.60	1159.18	1172.76	1186.35	1199.93	1213.52	1227.13	1246.84	1254.27	1267.85
SEC4	1239.74	1246.15	1261.33	1276.51	1291.69	1368.75	1322.55	1337.23	1352.42	1367.60	1382.78	1397.96
SEC5	2879.63	2968.70	2942.78	2978.68	3145.90	3549.61	3864.27	3122.39	3158.22	3194.12	3232.89	3265.94
SEC6	645.31	653.49	661.67	669.84	678.20	686.20	694.37	725.59	717.28	718.95	727.82	735.26
SEC7	785.96	796.32	861.83	816.18	826.26	836.34	846.41	0	866.56	876.64	886.71	896.79
SEC8	9473.59	9596.50	9719.48	9842.32	9965.23	1881.40	1211.57	1333.96	1456.87	1579.78	1726.94	1825.65
SEC9	2263.30	2292.98	2322.66	2352.33	2382.14	2411.69	2441.37	2471.58	2572.98	2534.88	2568.78	2589.77
SEC10	1231.49	1247.83	1264.11	1284.25	1296.74	1313.48	1329.36	1345.67	1361.99	1378.29	1394.63	1419.14
SEC11	1937.58	1963.49	1989.40	2153.15	2412.74	2671.13	2931.92	2118.93	2144.83	2177.37	2196.64	2222.55
SEC12	4766.48	4771.37	4833.63	4897.12	4966.41	5249.37	5875.82	5151.80	5214.56	5278.49	5341.54	5452.68
SEC13	192.34	194.96	197.57	219.32	228.66	254.23	283.93	216.56	213.27	215.89	218.55	221.13
SEC14	3512.65	3567.64	3689.23	3657.82	3752.49	3753.44	3815.59	3849.72	3897.88	3946.36	3994.20	4423.55
SEC15	16893.67	17127.18	17363.76	17593.73	17827.95	18644.79	18293.85	18527.16	18765.21	18993.88	19227.23	19465.92
SEC16	255.65	259.23	262.76	266.32	269.87	273.43	276.99	285.42	284.98	287.65	291.21	294.77
SEC17	2564.13	2642.12	2635.95	2671.87	2777.79	2743.70	2779.63	2815.52	2851.43	2887.34	2923.25	2959.16
SEC18	5436.86	5572.35	5583.78	5663.32	5736.88	5813.43	5889.98	5966.53	6437.37	6119.62	6196.18	6272.72
SEC19	32533.37	32579.67	32962.48	33417.47	33871.62	34326.19	34787.57	35235.33	35689.90	36144.47	36599.38	37536.80
SEC20	9831.16	9973.36	1115.56	1257.74	1399.94	1531.21	1671.43	1811.65	1951.87	11929.72	11232.32	11372.53
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	28452.96	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	194815.9	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	15000	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	161138.5	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	121566.5	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	144764.8	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	48995.14	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	219378.2	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	196787.2	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	48446.59	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	953424.2	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	716133.1

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D49	COM_D50	COM_D51	COM_D52	COM_D53	COM_D54	COM_D55	COM_D56	COM_D57	COM_D58	COM_F1	COM_F2
FACT1	45574.80	45888.33	46312.87	46261.69	46492.93	46722.50	46952.90	47183.33	47413.76	47644.20	47874.51	48149.16
FACT2	36317.74	36133.45	35888.95	35674.56	35461.66	35245.77	35313.79	34816.99	34625.92	34388.20	34173.86	33959.41
SEC1	32371.84	32748.52	33378.60	33378.67	33738.75	34368.82	34369.89	34728.98	35359.51	35368.91	35719.23	36349.28
SEC2	672.61	679.64	686.67	693.70	772.84	777.57	714.79	721.81	728.84	735.87	742.90	749.93
SEC3	1281.44	1295.27	1386.48	1322.19	1335.77	1349.36	1362.94	1376.53	1391.96	1436.94	1417.28	1438.62
SEC4	1413.14	1428.32	1443.50	1458.68	1473.86	1489.37	1542.17	1519.40	1534.58	1549.76	1564.94	1581.18
SEC5	3318.42	3337.75	3373.66	3495.62	3445.47	3481.37	3517.28	3553.19	3589.94	3625.15	3669.77	3696.81
SEC6	743.44	751.61	759.80	767.97	776.15	784.32	792.50	867.64	888.53	817.37	825.28	833.38
SEC7	968.66	916.94	927.18	937.93	947.17	957.24	967.33	977.40	987.47	997.55	1762.39	1177.00
SEC8	1948.52	11714.26	11194.34	11317.25	11441.59	11563.69	11685.98	11888.92	11931.82	12547.13	12177.62	12353.43
SEC9	2619.45	2649.12	2678.84	2784.83	2738.16	2767.85	2797.52	2827.20	2856.88	2886.56	2916.24	2945.91
SEC10	1427.23	1443.54	1459.85	1476.16	1492.47	1587.88	1525.92	1541.43	1557.71	1574.25	1593.37	1666.48
SEC11	2248.45	2274.37	2326.66	2326.17	2352.78	2377.98	2438.92	2429.80	2455.72	2481.68	2575.14	2533.42
SEC12	5468.52	5532.47	5595.49	5658.98	5722.47	5785.97	5849.45	5912.94	5976.43	6399.16	6134.54	6166.89
SEC13	223.74	226.35	228.97	231.59	234.22	236.82	239.44	242.51	244.67	247.28	249.94	252.52
SEC14	4951.38	4138.67	4186.83	4234.99	4283.15	4331.39	4379.47	4427.63	4475.79	4523.95	4572.15	4622.64
SEC15	19693.95	19927.38	2166.64	2394.22	2627.38	2867.37	21949.43	21327.45	21568.88	21794.17	22275.24	22268.90
SEC16	298.32	318.85	354.37	389.93	312.55	316.16	319.66	323.22	326.78	333.32	333.89	337.45
SEC17	2995.76	3398.83	3669.51	3128.13	3138.72	3174.64	3215.49	3246.46	3282.37	3318.29	3354.20	3391.12
SEC18	6349.27	6425.82	6523.64	6578.91	6655.46	6732.96	6885.59	6885.17	6961.65	7382.34	7114.75	7191.32
SEC19	37581.78	37962.75	38417.32	38871.89	39326.46	39781.29	4235.60	4691.69	41144.74	41599.39	42538.79	42584.49
SEC20	11512.75	11652.97	11793.19	11933.47	12736.26	12213.85	12354.65	12494.28	12634.54	12774.72	12914.94	13551.62
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F3	COM_F4	COM_F5	COM_F6	COM_F7	COM_F8	COM_F9	COM_F10	COM_F11	COM_F12	COM_F13	COM_F14
FACT1	48335.32	48565.72	48796.13	49265.30	49256.93	49487.34	49717.74	49948.14	5178.55	5489.49	5639.35	5869.76
FACT2	33745.20	33536.26	33316.23	33118.39	32887.45	32673.53	32458.66	32244.27	32298.73	31815.48	31618.61	31386.69
SEC1	36367.94	36794.31	37339.57	37366.96	37699.97	38329.74	38365.98	38698.99	39319.96	39365.39	39698.12	4311.92
SEC2	756.96	763.98	771.13	778.44	785.69	792.97	799.13	861.54	813.18	822.16	827.24	834.27
SEC3	1444.45	1458.33	1471.61	1485.20	1498.78	1512.37	1525.96	1539.54	1553.12	1566.73	1582.87	1593.87
SEC4	1595.30	1614.78	1625.66	1648.38	1656.18	1671.20	1686.38	1715.59	1716.74	1731.92	1747.99	1762.28
SEC5	3732.73	3768.63	3845.34	3844.44	3876.35	3912.25	3948.17	3984.67	4199.73	4558.80	4917.86	4127.69
SEC6	841.56	849.74	857.92	866.93	874.27	882.45	896.25	898.82	969.79	915.16	923.33	931.51
SEC7	1277.75	1378.51	1479.27	1582.83	1687.86	1781.54	1882.32	1983.60	1183.82	1118.46	1128.53	1138.69
SEC8	12423.45	12546.36	12669.27	12792.18	12915.88	13379.99	13169.98	13283.83	13467.31	13529.64	13652.55	13775.46
SEC9	2975.59	3527.27	3349.52	3646.36	3943.96	3123.99	3153.67	3183.35	3213.26	3242.75	3272.38	3326.26
SEC10	1622.96	1639.27	1655.58	1671.89	1688.23	1745.15	1728.26	1737.14	1753.45	1769.76	1786.73	1823.81
SEC11	2559.33	2585.23	2611.14	2637.43	2662.95	2688.86	2714.76	2746.67	2766.57	2792.48	2818.38	2844.30
SEC12	6233.83	6293.87	6357.36	6428.52	6484.34	6547.83	6611.32	6674.86	6738.29	6817.84	6865.27	6928.76
SEC13	255.13	257.75	263.66	262.98	265.60	268.21	278.38	273.45	276.63	278.68	281.30	283.91
SEC14	4668.42	4716.58	4764.74	4812.93	4861.59	4992.18	4957.38	5553.67	5536.96	5118.55	5151.43	5198.17
SEC15	22494.24	22727.60	22969.53	23194.32	23427.67	23661.25	23894.38	24127.74	24361.98	24594.45	24827.81	25611.70
SEC16	341.15	344.56	348.11	351.68	355.23	358.78	362.34	365.90	369.45	373.97	376.57	381.23
SEC17	3426.22	3461.93	3497.85	3533.76	3569.67	3655.83	3641.50	3677.48	3713.32	3749.23	3785.14	3821.56
SEC18	7267.85	7344.40	7429.46	7497.49	7574.42	7655.99	7727.14	7836.88	7882.36	7956.78	8333.33	8198.81
SEC19	42963.20	43417.59	43872.16	44326.73	44781.31	45235.87	45694.44	46145.15	46599.59	47541.57	47587.29	47963.30
SEC20	13195.38	13335.67	13475.82	13616.40	13756.26	13896.48	14366.98	14176.92	14317.14	14457.36	14597.58	14737.79
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F15	COM_F16	COM_F17	COM_F18	COM_F19	COM_F20	COM_F21	COM_F22	COM_F23	COM_F24	COM_F25	COM_F26
FACT1	51115.93	51335.63	51569.66	51791.37	52217.72	52252.18	52482.58	52712.98	52943.39	53173.79	53441.92	53634.60
FACT2	31172.30	3957.97	3743.51	3529.12	3314.73	3133.29	29885.94	29671.55	29457.15	29242.76	29283.66	28813.97
SEC1	4364.27	4697.34	41341.97	41363.50	41696.57	42296.48	42362.72	42695.80	43288.76	43361.95	43694.13	44271.14
SEC2	841.30	848.32	855.35	862.39	869.49	876.44	883.47	894.94	897.52	945.52	911.58	918.68
SEC3	1674.56	1621.40	1634.62	1648.28	1661.79	1675.38	1688.97	1725.45	1716.13	1729.71	1743.30	1756.88
SEC4	1777.46	1792.64	1878.26	1823.23	1838.18	1853.37	1868.55	1883.73	1898.92	1914.81	1929.26	1944.44
SEC5	4163.60	4199.56	4235.41	4271.32	4372.26	4343.13	4379.39	4414.95	4458.52	4486.76	4522.66	4558.57
SEC6	939.69	947.86	956.42	964.22	972.40	985.73	988.75	996.93	151.44	113.28	121.46	129.64
SEC7	1148.68	1158.77	1168.84	1178.91	1188.99	1199.64	1291.40	1219.22	1229.29	1239.37	1249.44	1259.52
SEC8	13898.37	14212.85	14144.20	14267.18	14391.79	14512.93	14635.84	14758.75	14881.67	15457.18	15127.48	15253.93
SEC9	3331.74	3361.43	3392.00	3427.79	3454.58	3481.37	3598.16	3539.49	3569.17	3598.85	3628.53	3658.21
SEC10	1818.69	1835.37	1851.31	1867.63	1883.94	1924.83	1916.56	1932.88	1949.18	1965.49	1981.84	1998.12
SEC11	2871.97	2896.13	2922.84	2947.91	2973.82	2999.73	3256.33	3515.38	3774.44	3133.50	3129.26	3155.16
SEC12	6992.26	7557.40	7119.23	7182.72	7246.27	7396.96	7373.18	7436.67	7516.25	7563.65	7627.14	7696.29
SEC13	286.53	289.15	291.76	294.38	296.99	299.61	322.27	348.43	374.59	317.56	312.69	315.38
SEC14	5246.33	5294.49	5342.65	5398.95	5438.97	5487.13	5535.29	5583.45	5631.65	5679.76	5727.92	5776.82
SEC15	25294.53	25527.88	25761.24	25994.60	26227.96	26461.31	26694.67	26928.29	27161.39	27394.74	27628.11	27861.46
SEC16	383.68	387.24	397.92	394.35	397.95	414.61	451.78	485.74	412.14	415.69	419.24	422.87
SEC17	3856.97	3892.89	3928.79	3964.76	4617.28	4365.29	4724.42	4183.54	4144.27	4181.78	4216.94	4252.26
SEC18	8186.43	8262.98	8339.53	8416.75	8492.62	8569.17	8645.73	8722.27	8798.82	8875.37	8951.91	9284.63
SEC19	48417.86	48872.43	49327.14	49781.57	5236.14	5697.12	51145.28	51599.85	52544.22	52589.92	52963.56	53418.13
SEC20	14878.14	15182.33	15158.45	15298.67	15438.89	15579.12	15719.33	15859.55	15999.77	16139.99	16282.77	16424.27
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F27	COM_F28	COM_F29	COM_F30	COM_F31	COM_F32	COM_F33	COM_F34	COM_F35	COM_F36	COM_F37	COM_F38
FACT1	53865	54954.22	54325.86	54556.29	54786.61	55171.54	55247.42	55477.82	55782.25	55938.63	56169.32	56399.44
FACT2	28599.58	28385.19	28177.93	27956.40	27742.65	27527.61	27313.22	27988.27	26884.43	26674.00	26455.65	26241.25
SEC1	44361.18	44693.13	45261.33	45359.15	45692.15	46251.56	46358.16	46691.17	47241.79	47357.19	47691.95	48232.16
SEC2	925.64	932.66	939.69	946.72	953.75	967.78	967.86	974.83	981.86	988.89	995.92	1294.82
SEC3	1774.65	1784.49	1797.63	1811.22	1824.82	1838.39	1851.97	1865.55	1879.14	1892.72	1963.67	1919.90
SEC4	1959.62	1974.82	1989.98	2516.22	2234.24	2355.23	2572.75	2658.83	2816.39	2962.43	2111.42	2126.64
SEC5	4594.48	4633.85	4666.29	4721.98	4738.14	4774.19	4899.17	4845.82	4881.74	4917.64	4953.54	4989.45
SEC6	137.81	145.99	154.17	162.34	175.21	178.70	186.88	195.53	113.23	111.15	111.96	112.78
SEC7	1269.59	1279.67	1289.75	1299.82	1398.98	1319.97	1334.93	1341.25	1352.79	1362.77	1373.52	1384.28
SEC8	15373.34	15496.21	15619.13	15742.37	15864.95	15987.86	16117.69	16233.68	16356.60	16479.51	16624.12	16725.32
SEC9	3687.89	3717.57	3747.25	3776.93	3866.54	3836.28	3865.96	3895.64	3925.32	3955.38	3984.68	4143.58
SEC10	2144.26	2373.74	2474.86	2633.60	2796.79	2959.82	2112.29	2128.64	2144.92	2161.23	2177.54	2193.85
SEC11	3181.68	3269.73	3232.88	3258.79	3284.69	3315.97	3336.54	3362.49	3388.31	3414.23	3441.27	3466.33
SEC12	7754.12	7817.67	7881.96	7944.59	8874.20	8715.63	8135.52	8198.54	8262.34	8325.52	8389.80	8452.50
SEC13	317.92	325.48	323.16	325.77	328.39	331.68	333.62	336.24	338.86	341.47	344.88	346.74
SEC14	5824.24	5872.45	5925.60	5968.72	6168.78	6653.69	6113.20	6161.36	6295.14	6257.67	6358.32	6353.99
SEC15	28948.16	28328.17	28561.54	28794.89	29282.45	29261.63	29494.96	29728.32	29961.67	3195.32	3428.39	3661.75
SEC16	426.36	429.91	433.47	437.26	445.82	444.14	447.70	451.25	454.88	458.36	461.92	465.48
SEC17	4287.91	4323.83	4359.74	4395.65	4431.56	4467.48	4533.88	4539.34	4575.21	4611.12	4647.37	4682.95
SEC18	9151.11	9181.56	9258.18	9334.66	9411.25	9487.75	9564.32	9648.52	9717.40	9793.95	9874.95	9947.44
SEC19	53872.73	54327.27	54781.84	55236.41	55699.83	56145.55	56612.34	57546.93	57592.64	57963.83	58418.44	58872.97
SEC20	16566.46	16786.58	16841.85	16981.35	17121.52	17261.74	17419.63	17542.18	17682.41	17822.63	17962.84	18135.96
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F39	COM_F40	COM_F41	COM_F42	COM_F43	COM_F44	COM_F45	COM_F46	COM_F47	COM_F48	COM_F49	COM_F50
FACT1	56629.84	56862.42	57964.52	57321.48	57551.45	57781.86	58122.58	58242.66	58473.65	58734.68	58933.87	59164.27
FACT2	26268.65	25812.47	25598.73	25383.68	25169.29	24954.89	24745.21	24526.17	24311.71	24973.23	23882.93	23668.53
SEC1	48356.29	48689.22	49222.24	49355.23	49688.24	5212.47	5354.25	5687.26	51227.33	51353.28	51686.29	52192.93
SEC2	1997.66	1174.96	1243.33	1316.18	1389.69	1451.18	1521.47	1591.75	1662.35	1732.32	1826.28	1872.89
SEC3	1933.47	1947.60	1966.43	1974.23	1987.81	2139.56	2149.80	2285.64	2421.48	2557.32	2693.16	2829.42
SEC4	2141.78	2156.96	2172.14	2187.32	2225.44	2217.68	2232.86	2248.45	2263.23	2278.45	2293.59	2387.66
SEC5	5253.57	5612.63	5971.70	5133.76	5168.98	5248.90	5247.97	5276.73	5312.69	5348.52	5384.42	5423.29
SEC6	113.59	114.41	115.23	116.47	116.86	117.68	118.51	119.32	121.36	129.53	121.78	122.59
SEC7	1395.40	1457.97	1416.56	1427.31	1438.71	1448.83	1459.59	1461.34	1471.11	1481.19	1491.26	1513.38
SEC8	16848.23	16971.14	17945.53	17216.97	17339.88	17462.79	17585.70	17786.93	17831.53	17954.44	18773.42	18225.25
SEC9	4443.74	4737.16	4133.95	4133.74	4162.75	4192.43	4222.11	4251.79	4281.47	4311.15	4348.27	4375.63
SEC10	2211.70	2226.47	2242.78	2259.93	2275.45	2291.72	2382.69	2324.34	2346.49	2356.96	2373.27	2389.58
SEC11	3491.94	3517.84	3543.75	3569.66	3595.56	3621.47	3647.37	3673.28	3699.19	3725.92	3759.98	3776.94
SEC12	8515.99	8579.47	8642.96	8764.53	8769.94	8833.44	8896.92	8964.86	9238.98	9873.87	9158.75	9214.36
SEC13	349.32	351.94	354.55	357.17	359.79	362.42	365.18	367.63	372.58	372.87	375.48	379.00
SEC14	6421.57	6453.98	6498.47	6546.63	6594.79	6642.95	6691.15	6739.26	6787.42	6835.58	6883.74	6931.98
SEC15	3895.15	31128.46	31361.82	31595.18	31828.53	32618.91	32295.25	32528.66	32761.96	32995.32	33228.68	33462.36
SEC16	469.34	472.59	476.15	479.73	483.26	486.82	493.73	493.93	497.49	514.21	545.99	581.56
SEC17	4718.87	4754.77	4796.85	4826.60	4862.60	4898.42	4934.33	4972.46	5615.84	5427.61	5779.83	5113.89
SEC18	1235.92	1114.79	1176.69	1253.24	1329.79	1463.35	1482.88	1559.43	1635.98	1712.53	1789.77	1865.63
SEC19	59327.54	59782.11	6236.68	6691.25	61145.82	61639.47	62549.65	62595.35	62964.16	63418.68	63873.25	64327.82
SEC20	18243.28	18383.50	18523.72	18663.94	18841.56	18944.38	19845.95	19224.81	19365.34	19552.53	19645.47	19785.69
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F51	COM_F52	COM_F53	COM_F54	COM_F55	COM_F56	COM_F57	COM_F58	TTM1	DIRTAX1	VAT1	EXCSTAX1
FACT1	59394.68	59625.82	59855.48	6858.88	6316.29	6546.69	6777.98	61751.32	61237.95	61468.38	61698.71	61929.11
FACT2	23454.14	23239.75	23253.54	22819.65	22596.57	22382.17	22167.79	21953.39	21738.99	21524.66	21312.73	21958.14
SEC1	52352.34	52685.38	53183.16	53351.32	53684.34	54173.38	54353.47	54683.35	55163.61	55349.37	55682.38	56153.85
SEC2	1943.17	1113.45	1183.74	1115.42	1122.43	1129.46	1136.49	1143.52	1155.44	1157.57	1164.68	1171.63
SEC3	2964.85	2116.87	2123.65	2137.24	2158.22	2164.45	2177.99	2191.57	2251.58	2218.74	2232.33	2245.91
SEC4	2323.95	2339.13	2354.36	2369.49	2384.67	2399.85	2415.27	2432.70	2445.39	2465.67	2475.75	2499.28
SEC5	5456.24	5492.14	5528.49	5563.96	5599.86	5635.77	5671.67	5775.81	5743.49	5779.39	5815.40	5851.28
SEC6	123.46	124.22	125.42	125.86	126.68	127.49	128.31	129.13	129.95	137.66	131.58	132.41
SEC7	1511.41	1521.49	1531.57	1541.65	1551.72	1561.79	1571.87	1581.94	1592.20	1629.56	1612.17	1622.25
SEC8	18323.16	18446.75	18568.98	18691.90	18814.86	18937.72	19662.85	19183.54	19364.50	19429.36	19552.27	19675.18
SEC9	4418.52	4429.86	4459.54	4489.22	4518.91	4548.58	4578.26	4679.38	4637.62	4667.30	4696.98	4726.65
SEC10	2458.94	2422.25	2438.52	2454.83	2471.14	2487.45	2537.66	2527.17	2536.38	2552.69	2569.52	2585.32
SEC11	3828.95	3828.72	3854.62	3885.27	3964.33	3932.34	3958.25	3984.16	4156.83	4359.63	4618.69	4877.75
SEC12	9277.85	9341.34	9448.31	9468.32	9531.89	9595.30	9658.79	9722.28	9785.77	9849.25	9912.74	9976.23
SEC13	387.17	383.33	385.95	388.57	391.18	393.80	396.41	399.33	416.47	442.63	468.79	494.96
SEC14	6985.99	7282.19	7763.79	7124.54	7172.70	7228.55	7269.15	7317.17	7365.33	7413.49	7461.66	7598.12
SEC15	33695.39	33928.76	34162.18	34395.47	34628.82	34862.18	35955.38	35328.89	35562.25	35795.70	36289.67	36262.32
SEC16	511.71	515.27	518.82	522.39	525.94	529.49	533.53	536.67	541.63	543.72	547.28	558.33
SEC17	5149.87	5185.72	5221.63	5257.54	5293.46	5329.37	5365.28	5411.92	5437.15	5473.17	5589.29	5544.84
SEC18	1942.17	11187.22	11952.75	11171.82	11248.37	11324.92	11414.64	11478.13	11554.56	11631.20	11776.58	11784.26
SEC19	64782.39	65236.96	65691.53	66146.96	66666.70	67552.36	67598.63	67964.38	68418.95	68873.52	69328.87	69782.66
SEC20	19925.91	2661.38	2263.52	2346.57	2486.79	2627.84	2767.23	2974.47	21476.66	21187.89	21328.15	21468.32
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	TARIFF1	OINDTAX1	SUBY1	HHH1	HHH2	HHH3	HHH4	HHH5	GOV1	POE1	ROW1	KA
FACT1	62159.52	62389.92	62623.24	62857.28	63811.32	63311.53	63541.94	63772.35	64274.43	64233.15	64463.56	0
FACT2	2881.43	2667.27	2452.63	2238.25	2238.47	19894.54	19595.69	19386.68	19166.27	18951.89	18737.49	0
SEC1	56348.39	56681.40	57144.69	57347.41	57684.23	58134.30	58346.44	58679.44	59124.52	59345.47	59678.47	0
SEC2	1178.66	1185.69	1192.71	1199.74	1267.79	1213.80	1228.28	1227.86	1234.88	1241.91	1248.94	0
SEC3	2259.49	2273.78	2286.66	2324.66	2313.84	2327.41	2349.99	2354.58	2368.17	2381.75	2395.34	0
SEC4	2561.79	2521.29	2536.47	2551.65	2566.83	2582.86	2597.19	2612.37	2627.55	2642.73	2657.99	0
SEC5	5887.11	5923.27	5958.93	5994.83	6374.33	6666.47	6125.53	6138.46	6174.37	6212.73	6246.18	0
SEC6	133.22	134.37	134.85	135.67	136.49	137.37	138.13	138.94	139.77	145.78	141.40	0
SEC7	1632.32	1642.40	1652.47	1662.55	1672.63	1682.72	0	1728.54	1712.93	1723.58	1733.89	0
SEC8	19798.93	19921.36	2439.14	2166.83	2289.74	2412.65	2535.56	2658.47	2781.38	2942.90	21272.79	0
SEC9	4756.33	4786.12	4815.69	4845.37	4875.49	4947.29	4934.48	4964.87	4993.77	5234.45	5531.24	0
SEC10	2616.27	2617.94	2634.25	2655.69	2666.87	2683.18	2699.49	2715.85	2732.12	2748.43	2764.74	0
SEC11	4113.68	4139.59	4165.49	4191.40	4217.34	4243.22	4269.12	4295.22	4329.28	4346.83	4372.74	0
SEC12	1397.29	1132.99	1166.70	1231.88	1293.68	1357.17	1426.55	1484.14	1547.63	1611.12	1674.62	0
SEC13	412.11	414.73	417.34	419.97	422.58	425.19	427.90	434.27	433.42	435.66	438.28	0
SEC14	7557.97	7661.28	7654.29	7724.46	7756.55	7798.76	7846.92	7895.83	7943.24	7991.41	8395.61	0
SEC15	36495.68	36729.39	36962.40	37195.75	37429.11	37662.47	37895.83	38129.18	38362.54	38595.90	38829.26	0
SEC16	554.39	557.95	561.52	565.58	568.61	572.17	575.73	579.28	582.85	586.40	589.95	0
SEC17	5587.53	5616.67	5652.58	5688.49	5724.42	5763.14	5796.23	5832.14	5868.58	5939.63	5939.88	0
SEC18	11867.55	11937.33	12138.52	12941.18	12166.95	12243.50	12324.54	12396.59	12473.14	12549.70	12626.24	0
SEC19	7237.23	7691.80	71146.37	71693.75	72555.76	72517.77	72964.65	73419.22	73873.79	74328.36	74782.93	0
SEC20	21685.44	21748.76	21888.98	22292.21	22169.42	22396.49	22449.86	22597.96	22733.00	22875.18	23173.78	0
SEC21	0	0	0	0	0	0	0	0	0	0	0	0
SEC22	0	0	0	0	0	0	0	0	0	0	0	0
SEC23	0	0	0	0	0	0	0	0	0	0	0	0
SEC24	0	0	0	0	0	0	0	0	0	0	0	0
SEC25	0	0	0	0	0	0	0	0	0	0	0	0
SEC26	0	0	0	0	0	0	0	0	0	0	0	0
SEC27	0	0	0	0	0	0	0	0	0	0	0	0
SEC28	0	0	0	0	0	0	0	0	0	0	0	0
SEC29	0	0	0	0	0	0	0	0	0	0	0	0
SEC30	0	0	0	0	0	0	0	0	0	0	0	0
SEC31	0	0	0	0	0	0	0	0	0	0	0	0
SEC32	0	0	0	0	0	0	0	0	0	0	0	0
SEC33	0	0	0	0	0	0	0	0	0	0	0	0
SEC34	0	0	0	0	0	0	0	0	0	0	0	0
SEC35	0	0	0	0	0	0	0	0	0	0	0	0
SEC36	0	0	0	0	0	0	0	0	0	0	0	0
SEC37	0	0	0	0	0	0	0	0	0	0	0	0
SEC38	0	0	0	0	0	0	0	0	0	0	0	0
SEC39	0	0	0	0	0	0	0	0	0	0	0	0
SEC40	0	0	0	0	0	0	0	0	0	0	0	0
SEC41	0	0	0	0	0	0	0	0	0	0	0	0
SEC42	0	0	0	0	0	0	0	0	0	0	0	0
SEC43	0	0	0	0	0	0	0	0	0	0	0	0
SEC44	0	0	0	0	0	0	0	0	0	0	0	0
SEC45	0	0	0	0	0	0	0	0	0	0	0	0
SEC46	0	0	0	0	0	0	0	0	0	0	0	0
SEC47	0	0	0	0	0	0	0	0	0	0	0	0
SEC48	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	FACT1	FACT2	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	SEC8	SEC9	SEC10
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	55483.94	2132.14	2836.33	3557.16	116.77	181.93	840	0	0	0
COM_D2	0	0	0	2394.65	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	6639	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	3493.63	33191.63	379.45	0	0	0	0
COM_D5	0	0	0	0	0	0	4926.40	159.59	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	273.69	0	429.37	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	757.54	0.00	0.00
COM_D9	0	0	0	0	0	0	0	0	0	0	612.14	167.82
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	13251.18	175.72	0	0	897.85	298.62	0	0	0	0
COM_D13	0	0	314.89	417.54	0	0	214.94	712.40	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	19784.62	252.43	168.19	1272.90	146.63	472.35	1645.30	12916.95	485.42	254.88
COM_D16	0	0	0	0	217.46	157.84	254.77	853.36	127.33	1543.15	579.90	344.92
COM_D17	0	0	0	0	0	0	448.89	144.26	0	3814.43	143.20	751.89
COM_D18	0	0	0	0	0	0	477.52	345.31	0	0	0	0
COM_D19	0	0	2677.60	193.12	0	0	418.49	211.23	172.39	1241.68	873.85	458.84
COM_D20	0	0	459.16	336.30	0	0	223.85	112.49	295.19	212.59	324.47	173.72
COM_D21	0	0	5461.57	971.22	155.79	538.99	256.98	113.13	1422.15	644.80	827.33	434.41
COM_D22	0	0	829.56	0	0	0	0	0	0	725.99	159.25	835.10
COM_D23	0	0	579.15	0	0	0	0	0	0	0	0	0
COM_D24	0	0	122.44	0	0	0	992.31	0	0	0	0	0
COM_D25	0	0	7331.96	352.79	469.34	581.26	2384.83	0	0	0	0	0
COM_D26	0	0	3663.76	0	0	0	0	0	0	0	0	0
COM_D27	0	0	51981.70	0	0	0	0	0	0	0	0	0
COM_D28	0	0	473.37	0	0	0	611.30	116.58	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	656.63	0	0	0	0	0	0	0	0	0
COM_D31	0	0	114.52	0	0	0	367.77	183.16	0	0	0	0
COM_D32	0	0	1383.14	0	0	0	562.12	248.19	0	223.92	0	0
COM_D33	0	0	292.82	0	0	0	925.82	185.18	498.18	253.37	352.14	184.89
COM_D34	0	0	847.54	0	0	0	494.50	812.60	917.00	377.90	451.89	236.37
COM_D35	0	0	757.31	0	0	0	417.88	995.95	311.18	127.17	146.77	776.23
COM_D36	0	0	28673.59	0	0	0	0	0	0	0	0	0
COM_D37	0	0	1494.11	476.42	448.20	764.18	785.23	549.14	221.24	116.97	1399.80	546.66
COM_D38	0	0	145.13	328.36	0	0	0	0	0	678.17	0	0
COM_D39	0	0	3185.47	274.52	916.89	226.10	586.65	129.31	0	782.14	1729.46	932.00
COM_D40	0	0	224.63	0	0	0	267.57	164.82	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC11	SEC12	SEC13	SEC14	SEC15	SEC16	SEC17	SEC18	SEC19	SEC20	SEC21	SEC22
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	194.80	292.20	0	0	0	0	0	0	1586.46	632.79	674.50
COM_D2	0	0	0	0	0	0	0	0	0	0	176.79	0
COM_D3	0	0	0	0	0	0	0	0	0	0	288.86	0
COM_D4	0	0	0	0	0	0	0	0	0	0	297.98	0
COM_D5	0	0	0	0	0	0	0	0	0	0	496.24	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	464.88	5413.77	0	0	0
COM_D8	390.00	1328.25	0	987.40	4223.99	0	598.23	257.60	0	0	0	0
COM_D9	0	0	0	0	0	0	0.00	14244.30	45262.93	0	0	0
COM_D10	1589.24	857.31	0	0	0	0	0	0	0	0	0	0
COM_D11	447.72	985.67	1293.38	0	495.44	0	0	0	247.80	222.99	2176.94	451.56
COM_D12	981.29	214.93	284.95	0	897.67	0	0	132.54	458.98	134.23	46352.28	536.32
COM_D13	314.00	687.80	0	0	287.28	0	0	319.24	591.88	497.19	22415.59	269.45
COM_D14	232.35	592.30	0	0	211.89	0	0	0	124.53	185.86	64876.16	738.86
COM_D15	559.22	122.44	0	0	511.37	2477.90	0	582.86	829.24	239.00	133134.5	1358.43
COM_D16	263.25	571.72	0	0	238.13	0	0	141.66	554.59	516.15	19967.11	185.56
COM_D17	685.00	131.62	0	0	549.74	0	0	179.45	1178.63	0	8829.27	117.59
COM_D18	592.90	797.23	0	858.14	352.65	0	514.43	1641.32	57661.55	219.29	13615.73	124.75
COM_D19	151.12	328.78	144.97	358.79	1375.56	125.96	212.15	3286.15	116328.9	0	38824.83	1416.75
COM_D20	557.45	122.80	538.23	132.86	515.80	467.50	787.75	1282.65	0.00	26128.77	6396.57	242.85
COM_D21	1869.58	1146.85	186.49	1364.20	5723.58	663.34	735.84	2665.92	3817.96	367.17	111830.0	2432.92
COM_D22	0	0	0	0	587.74	0	0	219.33	155.96	145.19	956.70	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	296.34	0	0	143.25	0
COM_D25	0	0	0	0	0	0	0	0	0	0	178.28	0
COM_D26	0	0	0	0	0	0	0	0	0	0	2865.64	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0.00	0
COM_D28	0	0	0	0	0	0	0	0	0	0	9924.94	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0.00	0
COM_D30	0	0	0	0	0	0	0	0	0	0	369.53	0
COM_D31	633.73	141.37	731.23	151.12	589.86	548.42	918.48	736.13	235.57	153.58	459.54	0
COM_D32	698.10	153.94	796.25	164.56	642.36	597.19	982.38	815.82	576.42	257.78	3856.00	135.21
COM_D33	578.80	126.76	559.48	135.29	531.14	485.42	817.98	669.61	475.95	212.83	5951.88	117.34
COM_D34	739.96	162.53	715.26	172.95	677.72	625.78	145.75	856.60	128.57	574.65	3853.29	218.94
COM_D35	1882.55	256.97	0	0	0	0	0	3731.35	587.85	262.88	848.82	654.25
COM_D36	0	0	0	0	0	0	0	0	323.61	144.71	0	0
COM_D37	141.50	395.34	271.10	333.32	129.48	118.44	199.63	266.18	176.99	791.45	2759.86	825.45
COM_D38	0	0	0	0	0	0	0	0	0	0	26545.51	235.70
COM_D39	659.74	132.67	596.79	141.62	555.76	572.74	856.17	931.32	814.54	364.25	519.53	246.95
COM_D40	0	0	0	0	0	0	0	0	0	0	238.91	135.38

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC23	SEC24	SEC25	SEC26	SEC27	SEC28	SEC29	SEC30	SEC31	SEC32	SEC33	SEC34
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	16643.66	117841.4	182965.8	9754.57	17749.63	779.88	2316.93	2638.70	248.40	294.32	4662.46	0.00
COM_D2	227.53	17491.23	2773.39	0	0	0	0	0	0	0	0	0
COM_D3	482.49	268.26	22925.13	354.14	644.42	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	11663.69	469.43	5292.65	135.17	1252.00	149.74	0	0	0	1848.92	0
COM_D6	0	0	0	5292.65	0	0.00	0	0	0	0	0	0
COM_D7	0	0	0	233.39	231.00	117.78	168.49	221.36	0	0	215.44	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	371.49	0	0	0	0	774.90	235.92	183.13	142.33	816.72	398.25
COM_D12	0	1211.67	1199.46	158.65	268.46	279.85	175.86	114.77	627.94	488.62	427.58	286.26
COM_D13	0	342	286.73	375.29	626.99	493.35	864.64	451.49	349.36	237.13	882.16	434.28
COM_D14	0	0	891.77	0	0	367.44	676.79	616.46	0	0	168.88	824.12
COM_D15	158.12	2521.24	1839.84	1532.71	178.23	2563.15	423.58	217.80	1641.22	1275.62	459.74	224.36
COM_D16	169.22	326.59	285.93	174.95	296.45	446.28	598.19	381.82	288.78	224.39	764.84	373.25
COM_D17	0	825.50	699.99	167.34	283.16	787.68	523.98	747.34	516.45	414.11	192.49	939.36
COM_D18	135.42	371.36	237.16	161.83	273.84	239.62	0	154.29	0	0	579.66	282.88
COM_D19	2816.91	8136.58	1278.65	7528.65	869.48	1663.95	296.12	24959.93	1342.27	4295.77	3257.74	846.79
COM_D20	482.90	1694.37	1779.36	1296.18	149.53	192.36	378.24	4514.80	239.83	774.73	545.99	152.82
COM_D21	1163.57	3431.96	864.11	1376.58	151.29	2556.87	895.42	1479.59	1458.23	4169.35	2762.96	419.13
COM_D22	0	689.86	359.77	825.15	489.48	718.60	0	471.65	129.27	0	181.61	0
COM_D23	0	42488.44	0.00	245.48	737.98	0	0	0	0	0	0	0
COM_D24	0	28639.35	135.36	5892.42	1762.79	849.98	0	0	0	0	0	0
COM_D25	0	2297.76	9654.57	8624.24	1628.74	2187.42	0	928.84	253.18	0	145.13	341.83
COM_D26	621.79	7618.21	797.83	13811.81	355.74	1846.67	0	0	0	0	122.83	0
COM_D27	0	0	0	0	1724.86	0	0	0	0	0	0	0
COM_D28	0	864.58	477.54	147.45	189.82	24919.17	0	0	0	0	0	0
COM_D29	0	145.44	198.00	447.30	296.00	153.64	4322.93	0	0	0	0	0
COM_D30	0	425.45	771.44	216.46	225.84	0	130.00	72338.34	3756.97	159431.7	1421.54	162.95
COM_D31	157.24	192.17	668.75	986.83	125.51	387.84	929.00	3823.72	3861.67	8949.97	272.83	593.84
COM_D32	246.87	898.77	335.59	496.83	254.51	117.52	132.21	373.20	627.47	2428.69	854.94	0.00
COM_D33	713.41	6115.63	244.88	2884.13	417.53	3438.65	1729.67	1182.87	121.33	1784.72	34393.34	9455.92
COM_D34	118.62	782.88	931.64	896.54	128.96	123.88	461.55	531.73	114.16	193.46	256.18	549.52
COM_D35	173.19	787.16	115.72	248.56	512.00	756.72	157.78	29928.59	2494.73	1556.47	2673.39	941.84
COM_D36	0	0	0	546.29	0	642.68	0	0	0	0	0	0
COM_D37	227.25	126.23	612.66	4625.97	147.62	3756.12	119.38	1317.90	1235.21	1742.64	3231.94	6512.94
COM_D38	0	198.72	311.97	176.49	0.00	897.49	124.43	322.82	496.66	171.57	114.87	418.17
COM_D39	623.97	3395.17	821.12	3151.57	185.84	1133.00	129.32	785.37	1943.46	2946.43	369.86	192.56
COM_D40	0	152.81	0	0	0	213.52	0	0	0	0	465.84	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC35	SEC36	SEC37	SEC38	SEC39	SEC40	SEC41	SEC42	SEC43	SEC44	SEC45	SEC46
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	577.95	594.62	5986.53	44865.26	199.42	173.89	647.28	776.73	634.78	245.36	444.13	0
COM_D2	0	0	292.92	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	643.42	0	0	0	0	0	0	0	0	0
COM_D5	572.25	494.91	258.17	0	0	0	865	0	0	0	0	0
COM_D6	0	0	113.82	0	0	0	0	0	0	0	0	0
COM_D7	955.73	0.00	616.25	0	0.00	991.65	273.60	124.32	986.95	0	0	0
COM_D8	0	546.71	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	624.52	0	0	112.56	451.79	0	221.81	0	0	0
COM_D12	0	0	379.54	1316.68	194.74	185.48	1245.19	114.77	365.53	586.37	954.34	461.91
COM_D13	0	0	924.73	315.42	465.11	887.27	875.57	274.22	174.85	142.65	228.63	194.91
COM_D14	0	0	982.92	428.92	0.00	184.18	781.34	667.84	362.95	254.63	497.89	268.70
COM_D15	936.60	341.46	626.43	2161.87	312.75	447.81	2863.96	188.83	797.69	1532.18	1524.63	613.23
COM_D16	144.24	523.76	196.69	372.94	549.49	623.90	365.69	321.48	122.95	182.38	268.37	132.68
COM_D17	285.97	135.28	182.33	664.48	984.17	168.47	652.33	597.69	316.98	299.58	485.77	0
COM_D18	6387.31	229.89	449.96	882.28	254.32	111.72	1758.87	232.29	221.54	347.68	159.67	158.98
COM_D19	13275.58	166.79	2664.72	5852.30	5233.18	1817.89	1889.45	2391.98	311.37	3352.84	5957.25	6223.15
COM_D20	2395.45	396.36	479.44	1556.59	938.33	328.20	1964.98	415.99	533.77	574.33	1212.35	1667.94
COM_D21	5158.66	397.62	2955.33	1792.66	1611.58	1328.71	2258.96	326.75	516.66	2356.85	3465.89	2576.77
COM_D22	514.65	685.43	835.94	474.52	352.92	27831.97	1511.39	212.64	1314.26	579.20	482.59	321.50
COM_D23	0	0	226.46	0	0	0	0	0	0	0	0	0
COM_D24	269.31	0	1975.86	0	216.98	0	0	0	615.00	0	0	0
COM_D25	496.97	195.10	4682.95	614.31	0	0	892.47	0	0	0	0	684.48
COM_D26	0	0	286.72	0	0	0	0	0	0	0	0	0
COM_D27	0	0	381.42	0	0	0	0	0	0	0	0	0
COM_D28	0	0	511.14	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	5549.33	122.13	179.59	2321.35	287.65	152.62	286.27	0	0	375.97	0	136
COM_D31	1934.64	169.72	923.49	496.86	446.52	698.73	537.27	386.15	0	299.44	398.30	179.44
COM_D32	381.13	453.39	687.32	166.65	328.70	147.17	132.18	661.82	0	429.76	451.13	836.12
COM_D33	1956.30	317.17	12983.89	654.50	626.45	1637.18	3192.98	428.75	472.96	2915.15	839.25	1349.71
COM_D34	716.39	368.82	846.19	129.22	167.69	424.48	369.47	826.13	199.87	132.51	229.54	426.95
COM_D35	118593.3	1722.49	13562.92	14354.23	55291.27	149.67	2962.12	399.42	862.19	749.27	1765.55	3767.59
COM_D36	0	769.91	0	0	0	0	226	0	0	0	0	0
COM_D37	219.85	258.12	23454.63	424.58	2599.95	574.90	1713.82	333.43	121.52	2771.84	818.67	1517.64
COM_D38	837.25	0	545.34	14533.43	2323.15	768.00	678.61	132.15	226.46	845.58	521.74	766.99
COM_D39	1923.94	781.87	3136.38	618.36	382.64	467.54	729.97	157.33	215.57	1252.89	383.74	9848.24
COM_D40	0	566.00	0	0	0	11751.48	8953.28	156.68	126.60	0	328.38	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC47	SEC48	SEC49	SEC50	SEC51	SEC52	SEC53	SEC54	SEC55	SEC56	SEC57	SEC58
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	887.12	386.43	3284.22	313.47	978.38	0.00	1285.69	736.44	94276.73	1764.73
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0.00
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0.00
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0.00
COM_D5	0	0	0	0	0	0	0	0	0	0	631.20	226.68
COM_D6	0	0	0	0	0	0	0	0	0	0	1258.19	222.12
COM_D7	0	445.56	0	0	0	0	474	0	0	0	794.97	478.49
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0.00
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0.00
COM_D10	0	0	136.96	0	0	0	0	0	0	0	0	0.00
COM_D11	969.57	0	325.57	0	656.43	369.17	551.97	0	111.48	375.45	398.13	116.27
COM_D12	166.15	162.80	644.47	138.57	932.35	782.99	969.28	0	163.85	6875.52	4294.30	294.59
COM_D13	132.18	253.83	179.26	327.37	455.25	364.81	499.23	0	717.79	3355.26	2273.89	141.71
COM_D14	689.96	145.13	393.23	622.85	249.73	529.83	725.16	0	144.26	0	915.52	0.00
COM_D15	1659.91	414.43	0	195.54	246.27	198.32	271.40	463.15	1217.65	16689.96	17316.36	284.82
COM_D16	375.44	747.93	177.49	278.75	239.33	598.44	818.94	736.69	289.69	2325.59	2573.83	292.59
COM_D17	466.65	892.61	0	548.35	837.52	951.26	131.77	0	151.56	0	0	0.00
COM_D18	576.96	734.68	0	143.48	0	472.83	647.57	0	3994.95	139.12	4874.49	136.47
COM_D19	14688.62	4162.42	2256.78	1714.87	2133.57	1422.76	4474.76	0	1661.75	66911.90	15187.80	1853.67
COM_D20	2517.93	713.55	377.24	293.83	365.75	243.96	766.98	0	275.34	11475.25	18672.28	325.64
COM_D21	6124.68	3459.87	766.76	1197.18	1469.34	596.63	2589.93	526.98	44122.89	19392.53	63181.41	11917.77
COM_D22	749.12	228.82	115.75	286.22	617.66	1195.37	184.93	194.75	22822.98	0	115.28	1178.58
COM_D23	0	0	0	2783	0	0	5136.83	0	0	0	37764.46	2152.37
COM_D24	0	0	0	532	0	0	0	0	0	0	21945.76	2179.83
COM_D25	159.71	0	615.28	113.39	491.55	0	0	0	0	0	16383.31	5267.27
COM_D26	0	0	0	0	0	0	399.66	0	0	1697.35	14493.99	1264.49
COM_D27	0	0	0	0	0	0	0	0	0	0	1992.66	548.49
COM_D28	0	0	0	0	0	0	0	0	0	1361.38	46526.97	3881.48
COM_D29	0	0	0	0	0.00	0	0	0	0	123.77	2554.89	638.68
COM_D30	317	163.62	722.22	7198.93	295.56	131.55	6184.14	264.00	237.78	1966.68	774.45	1572.69
COM_D31	418.69	278.93	231.32	1757.54	151.64	199.35	5375.32	688.28	253.18	6965.37	2845.22	3251.25
COM_D32	187.59	532.72	871.68	329.97	335.69	0	413.79	168.42	339.27	2562.56	6541.45	1472.83
COM_D33	2414.93	822.97	756.17	633.43	1248.96	266.49	5849.91	389.00	322.19	16733.64	33856.22	3927.83
COM_D34	981.61	373.44	337.88	559.36	215.92	437.74	128.29	147.88	914.83	2486.19	7263.58	124.56
COM_D35	8789.85	3265.67	263.46	3762.18	722.55	573.75	8461.79	738.87	197.69	175.13	716.11	2415.20
COM_D36	0	0	0	0	119.12	0	119.74	467.48	471.78	0.00	743.16	376.79
COM_D37	3541.17	6476.54	1996.55	3759.95	3497.58	956.49	3724.47	222.45	5797.32	16659.98	39177.64	5613.59
COM_D38	1789.64	1631.22	417.85	431.36	221.54	0.00	3461.89	775.79	2839.63	683.73	1699.33	25597.30
COM_D39	22979.24	158.45	526.17	814.94	484.94	735.45	3773.18	943.46	1715.53	2433.19	1748.97	1277.54
COM_D40	0	0	0	284.34	0.00	0	0	215.39	93532.50	114.29	167.68	1797.29

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Sector	COM_D1	COM_D2	COM_D3	COM_D4	COM_D5	COM_D6	COM_D7	COM_D8	COM_D9	COM_D10	COM_D11	COM_D12
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D13	COM_D14	COM_D15	COM_D16	COM_D17	COM_D18	COM_D19	COM_D20	COM_D21	COM_D22	COM_D23	COM_D24
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D25	COM_D26	COM_D27	COM_D28	COM_D29	COM_D30	COM_D31	COM_D32	COM_D33	COM_D34	COM_D35	COM_D36
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D37	COM_D38	COM_D39	COM_D40	COM_D41	COM_D42	COM_D43	COM_D44	COM_D45	COM_D46	COM_D47	COM_D48
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D49	COM_D50	COM_D51	COM_D52	COM_D53	COM_D54	COM_D55	COM_D56	COM_D57	COM_D58	COM_F1	COM_F2
SEC49	8480	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	175377.8	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	111164.3	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	299895.8	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	223377.7	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	31875.48	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	61567.51	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	214196.4	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	2681729	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	257666.6	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F3	COM_F4	COM_F5	COM_F6	COM_F7	COM_F8	COM_F9	COM_F10	COM_F11	COM_F12	COM_F13	COM_F14
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F15	COM_F16	COM_F17	COM_F18	COM_F19	COM_F20	COM_F21	COM_F22	COM_F23	COM_F24	COM_F25	COM_F26
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F27	COM_F28	COM_F29	COM_F30	COM_F31	COM_F32	COM_F33	COM_F34	COM_F35	COM_F36	COM_F37	COM_F38
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F39	COM_F40	COM_F41	COM_F42	COM_F43	COM_F44	COM_F45	COM_F46	COM_F47	COM_F48	COM_F49	COM_F50
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	0	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F51	COM_F52	COM_F53	COM_F54	COM_F55	COM_F56	COM_F57	COM_F58	TTM1	DIRTAX1	VAT1	EXCSTAX1
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	0	0	0	0	0	0	0	0	0
COM_D2	0	0	0	0	0	0	0	0	0	0	0	0
COM_D3	0	0	0	0	0	0	0	0	0	0	0	0
COM_D4	0	0	0	0	0	0	0	0	0	0	0	0
COM_D5	0	0	0	0	0	0	0	0	0	0	0	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	0	0
COM_D8	0	0	0	0	0	0	0	0	0	0	0	0
COM_D9	0	0	0	0	0	0	0	0	0	0	0	0
COM_D10	0	0	0	0	0	0	0	0	0	0	0	0
COM_D11	0	0	0	0	0	0	0	0	0	0	0	0
COM_D12	0	0	0	0	0	0	0	0	0	0	0	0
COM_D13	0	0	0	0	0	0	0	0	0	0	0	0
COM_D14	0	0	0	0	0	0	0	0	0	0	0	0
COM_D15	0	0	0	0	0	0	0	0	0	0	0	0
COM_D16	0	0	0	0	0	0	0	0	0	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	0	0
COM_D18	0	0	0	0	0	0	0	0	0	0	0	0
COM_D19	0	0	0	0	0	0	0	0	0	0	0	0
COM_D20	0	0	0	0	0	0	0	0	0	0	0	0
COM_D21	0	0	0	0	0	0	0	0	369997.8	0	0	0
COM_D22	0	0	0	0	0	0	0	0	0	0	0	0
COM_D23	0	0	0	0	0	0	0	0	0	0	0	0
COM_D24	0	0	0	0	0	0	0	0	0	0	0	0
COM_D25	0	0	0	0	0	0	0	0	0	0	0	0
COM_D26	0	0	0	0	0	0	0	0	0	0	0	0
COM_D27	0	0	0	0	0	0	0	0	0	0	0	0
COM_D28	0	0	0	0	0	0	0	0	0	0	0	0
COM_D29	0	0	0	0	0	0	0	0	0	0	0	0
COM_D30	0	0	0	0	0	0	0	0	0	0	0	0
COM_D31	0	0	0	0	0	0	0	0	0	0	0	0
COM_D32	0	0	0	0	0	0	0	0	0	0	0	0
COM_D33	0	0	0	0	0	0	0	0	0	0	0	0
COM_D34	0	0	0	0	0	0	0	0	0	0	0	0
COM_D35	0	0	0	0	0	0	0	0	0	0	0	0
COM_D36	0	0	0	0	0	0	0	0	0	0	0	0
COM_D37	0	0	0	0	0	0	0	0	0	0	0	0
COM_D38	0	0	0	0	0	0	0	0	0	0	0	0
COM_D39	0	0	0	0	0	0	0	0	0	0	0	0
COM_D40	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	TARIFF1	OINDTAX1	SUBY1	HHH1	HHH2	HHH3	HHH4	HHH5	GOV1	POE1	ROW1	KA
SEC49	0	0	0	0	0	0	0	0	0	0	0	0
SEC50	0	0	0	0	0	0	0	0	0	0	0	0
SEC51	0	0	0	0	0	0	0	0	0	0	0	0
SEC52	0	0	0	0	0	0	0	0	0	0	0	0
SEC53	0	0	0	0	0	0	0	0	0	0	0	0
SEC54	0	0	0	0	0	0	0	0	0	0	0	0
SEC55	0	0	0	0	0	0	0	0	0	0	0	0
SEC56	0	0	0	0	0	0	0	0	0	0	0	0
SEC57	0	0	0	0	0	0	0	0	0	0	0	0
SEC58	0	0	0	0	0	0	0	0	0	0	0	0
COM_D1	0	0	0	34596.39	45879.60	54642.76	87164.83	19396.86	1388.96	0	49928.73	22145.47
COM_D2	0	0	0	138.49	778.75	172.25	244.57	0	799.85	0	1494.90	13287.28
COM_D3	0	0	0	551.97	249.66	178.21	264.29	563.11	618.89	0	957.50	6643.64
COM_D4	0	0	0	593.42	453.66	353.90	523.90	863.32	0	0	498.44	2214.55
COM_D5	0	0	0	2128.22	3122.28	3666.15	5846.29	5159.69	193.97	0	2837.62	0
COM_D6	0	0	0	0	0	0	0	0	0	0	0	0
COM_D7	0	0	0	0	0	0	0	0	0	0	347.19	15285.54
COM_D8	0	0	0	0	0	0	0	0	0	0	5758.86	175783.7
COM_D9	0	0	0	0	0	0	0	0	0	0	4313.85	662.72
COM_D10	0	0	0	0	0	3292.56	5255.49	11972.83	0	0	3414.55	2567.72
COM_D11	0	0	0	439.24	1441.59	2127.29	3396.23	14276.66	336.93	0	16454.45	269.52
COM_D12	0	0	0	2479.84	3714.49	4274.45	5117.52	7796.32	1233.19	0	7631.58	251.14
COM_D13	0	0	0	419.82	718.27	269.11	297.49	711.16	389.26	0	0	0
COM_D14	0	0	0	221.16	993.83	688.88	414.17	258.44	1328.75	0	9438.14	435.26
COM_D15	0	0	0	2541.47	5645.73	6511.97	14218.28	33734.95	4487.96	0	36887.14	6337.44
COM_D16	0	0	0	186.13	183.55	295.86	751.45	1897.56	498.43	0	0	0
COM_D17	0	0	0	0	0	0	0	0	0	0	26571	1469.83
COM_D18	0	0	0	2654.92	4185.64	5722.41	6393.94	9497.36	682.84	0	7189.82	439.94
COM_D19	0	0	0	4678.13	6933.48	9627.16	15576.64	3515.43	8488.89	0	9436.22	5842.18
COM_D20	0	0	0	4596.44	6882.43	9428.95	15171.16	29159.74	7818.93	0	3577.88	5427.74
COM_D21	0	0	0	16674.30	26762.32	42554.47	67863.36	159392.6	14925.89	0	71759.67	0
COM_D22	0	0	0	128.76	175.38	219.56	351.37	398.46	0	0	4327.76	7647.11
COM_D23	0	0	0	7277.94	9911.94	12493.20	19788.77	22525.27	521.68	0	224.35	0
COM_D24	0	0	0	17176.39	23395.39	29289.57	46771.95	53153.82	659.89	0	236380.0	3479.75
COM_D25	0	0	0	17581.19	24523.16	29683.75	47215.58	43958.66	664.57	0	87467.43	17987.56
COM_D26	0	0	0	9588.38	13881.86	17263.55	27524.57	28812.56	969.20	0	29876.74	0
COM_D27	0	0	0	282.94	384.23	481.43	767.14	872.98	428.81	0	11288.96	0
COM_D28	0	0	0	11211.99	22191.57	35769.27	57416.91	94145.67	595.68	0	14368.62	26632.51
COM_D29	0	0	0	3333.34	5227.56	8537.65	13614.66	12783.76	0	0	4626.73	4287.15
COM_D30	0	0	0	246.58	417.73	615.88	982.97	1892.64	142.51	0	79468.11	17728.82
COM_D31	0	0	0	2229.35	3427.17	5522.74	8563.15	15522.29	211.83	0	51638.47	7546.92
COM_D32	0	0	0	16347.90	3559.26	47146.87	75183.70	152762.5	385.60	0	13614.96	15698.11
COM_D33	0	0	0	495.57	899.91	134.97	215.24	346.42	11362.46	0	28618.40	1234.19
COM_D34	0	0	0	551.19	1283.46	2563.33	3996.77	14137.20	1422.27	0	9465.69	658.26
COM_D35	0	0	0	724.85	187.53	133.71	213.23	322.20	932.00	0	168285.3	38945.90
COM_D36	0	0	0	668.28	178.91	225.81	369.88	228.97	3359.68	0	3296.66	7266.92
COM_D37	0	0	0	13725.97	18192.53	24114.65	38454.89	58169.94	13842.29	0	47494.93	28738.84
COM_D38	0	0	0	1571.40	2476.77	3824.63	6981.13	17374.37	221.00	0	135516.4	0
COM_D39	0	0	0	2672.43	5367.54	7427.34	11844.16	15456.67	146.26	0	36697.33	7164.85
COM_D40	0	0	0	248.88	348.82	454.96	725.51	173.18	187.11	0	15467.77	48927.84

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	FACT1	FACT2	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	SEC8	SEC9	SEC10
COM_D41	0	0	159.83	0	0	0	475.80	0	192.00	0	0	0
COM_D42	0	0	611.68	315.44	0	0	0	0	192.00	0	0	0
COM_D43	0	0	549.42	0	0	0	0	0	0	0	0	0
COM_D44	0	0	3171.96	143.00	161.86	143.34	591.67	517.33	275.88	0	0	0
COM_D45	0	0	1453.24	115.52	338.59	221.57	581.49	741.81	186.83	895.94	318.00	166.97
COM_D46	0	0	447.23	0	0	0	355.36	192.48	237.18	319.82	115.68	672.14
COM_D47	0	0	143.53	0	0	0	811.73	565.90	553.25	746.25	346.64	182.20
COM_D48	0	0	139.91	177.65	127.32	123.89	0	0	0	0	0	0
COM_D49	0	0	2118.72	0	0	0	0	0	0	197.24	0	0
COM_D50	0	0	193.98	0	0	0	0	0	0	0	0	0
COM_D51	0	0	978.23	0	0	0	145.72	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	167.78	266.96	172.35	0	284.64	113.75	799.89	295.43	454.91	236.54
COM_D54	0	0	0	0	0	0	292.97	147.73	0.00	0.00	342.37	179.78
COM_D55	0	0	532.54	325.83	875.83	349.34	859.52	551.99	457.27	629.94	363.41	198.14
COM_D56	0	0	2614.83	812.18	666.73	363.23	996.72	352.78	423.94	878.67	543.39	285.33
COM_D57	0	0	11358.67	355.19	1582.39	1853.81	2755.42	517.93	221.72	33732.48	9112.38	4783.57
COM_D58	0	0	822.68	235.55	0.00	455.37	583.47	615.46	349.80	792.38	488.26	256.37
COM_F1	0	0	2325.86	893.48	118.86	146.99	257.16	396.82	871.00	0	0	0
COM_F2	0	0	0	134.90	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	278.22	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	142.87	739.59	835.65	0	0	0	0
COM_F5	0	0	0	0	0	0	963.76	311.98	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	936.32	0	1542.20	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	5864.75	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0.00	228.66	638.48
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	1892.25	258.82	0	0	165.62	558.18	0	0	0	0
COM_F13	0	0	449.62	596.17	0	0	396.47	131.47	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	2713.97	359.87	239.90	181.73	269.42	871.28	227.62	1787.15	184.58	969.16
COM_F16	0	0	0	0	314.80	224.29	469.83	157.48	176.15	213.48	225.74	115.79
COM_F17	0	0	0	0	0	0	826.39	266.00	0	527.16	544.49	285.90
COM_F18	0	0	0	0	0	0	887.87	636.44	0	0	0	0
COM_F19	0	0	126.83	914.69	0	0	367.83	185.48	0	0	312.66	164.17
COM_F20	0	0	217	156.67	0	0	196.79	988.74	0	0	116.95	695.77
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	164.85	0	0	0	0	0	0	191.38	243.52	127.86
COM_F23	0	0	226.76	0	0	0	0	0	0	0	0	0
COM_F24	0	0	212.61	0	0	0	171.16	0	0	0	0	0
COM_F25	0	0	714.34	345.73	459.67	567.48	192.83	0	0	0	0	0
COM_F26	0	0	198.56	0	0	0	0	0	0	0	0	0
COM_F27	0	0	7495.62	0	0	0	0	0	0	0	0	0
COM_F28	0	0	829.00	0	0	0	197.65	297.15	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	134.16	0	0	0	0	0	0	0	0	0
COM_F31	0	0	622.14	0	0	0	143.59	748.00	0	0	0	0
COM_F32	0	0	255.28	0	0	0	125.37	614.69	0	555	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC11	SEC12	SEC13	SEC14	SEC15	SEC16	SEC17	SEC18	SEC19	SEC20	SEC21	SEC22
COM_D41	221.68	443.36	0.00	443.36	332.52	221.68	221.68	271.16	878.58	392.88	147.45	568.73
COM_D42	0	0	0	0	0	0	0	0	0	0	843.75	166.84
COM_D43	386.10	617.23	0	617.23	462.92	386.10	386.10	376.31	0	0	0	0
COM_D44	231.35	567.22	223.34	547.45	211.93	194.56	327.00	972.66	421.12	188.32	3114.27	443.64
COM_D45	645.90	141.46	623.74	159.71	591.64	541.71	912.83	281.89	3983.47	1781.39	2342.98	468.70
COM_D46	114.63	259.37	118.36	267.76	149.64	962.52	161.98	691.17	779.78	313.38	977.13	825.94
COM_D47	114.56	251.46	111.67	268.00	151.73	959.50	162.95	699.94	927.27	1635.69	2279.98	192.72
COM_D48	0	0	0	0	0	0	0	0	251.19	112.33	4292.48	0.00
COM_D49	0	0	0	0	0	0	0	0	0	0.00	12356.49	161.21
COM_D50	0	0	0	0	0	0	0	0	0	0.00	451.39	0.00
COM_D51	331.49	725.48	326.57	777.11	343.19	277.15	467.35	516.64	0	223.54	226.40	315.78
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	829.54	181.63	818.25	193.85	759.65	695.49	117.19	128.28	4113.72	1839.56	1666.32	294.61
COM_D54	116.47	255.14	112.42	272.29	167.48	977.16	165	273.72	0.00	0.00	2256.17	782.74
COM_D55	449.73	983.63	433.42	151.48	411.63	376.84	635.69	137.48	2141.97	957.84	1235.85	116.79
COM_D56	137.15	464.94	141.80	193.30	123.77	681.18	116.82	222.68	621.43	798.36	4779.83	4364.45
COM_D57	136.68	299.36	131.99	319.49	1252.16	114.64	193.17	6188.89	16514.95	7385.72	99489.53	1337.35
COM_D58	271.63	594.86	261.76	634.77	248.76	227.75	383.79	159.94	1891.58	845.86	3999.74	145.25
COM_F1	0	318.40	477.60	0	0	0	0	0	0	143.19	252.95	629.76
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	878.60	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	289.43	12985.87	0	0	0
COM_F8	24511.70	83483.49	0.00	62597.88	265481.3	0	37599.94	15767.47	0	0	0	0
COM_F9	0	0	0	0	0	0	0	5416.26	4555.40	0	0	0
COM_F10	642.94	325.98	0	0	0	0	0	0	0	0	0	0
COM_F11	172.40	372.85	491.77	0	155.73	0	0.00	0	249.39	224.43	226.51	124.30
COM_F12	373.13	817.25	182.46	0	341.33	0	0	539.88	461.93	135.93	4823.17	147.63
COM_F13	119.40	261.53	0	0	192.34	0	0	121.39	512.46	493.88	2332.40	745.59
COM_F14	882.29	193.63	0	0	857.60	0	0	0	125.32	192.84	6754.37	233.77
COM_F15	212.56	465.55	0	0	194.44	942.16	0	221.63	834.36	245.35	13852.73	373.92
COM_F16	989.86	216.82	0	0	954.82	0	0	396.83	558.16	519.47	2775.98	517.59
COM_F17	228.47	545.80	0	0	293.16	0	0	682.32	118.63	0.00	841.37	323.67
COM_F18	225.44	331.39	0	323.51	134.75	0.00	195.66	446.15	5831.84	226.96	1416.73	343.39
COM_F19	537.88	117.63	518.75	125.55	491.98	454.77	759.51	117.57	35558	0.00	617.64	147.45
COM_F20	199.43	436.79	192.58	466.15	182.69	167.27	281.85	458.93	0	7974.99	137.57	179.56
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	899.96	0	0	336	168.53	156.89	467.58	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0.00	0
COM_F24	0	0	0	0	0	0	0	382.59	0	0	479.78	0
COM_F25	0	0	0	0	0	0	0	0	0	0	117.63	0
COM_F26	0	0	0	0	0	0	0	0	0	0	313.91	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	465.85	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	539.00	0	755.16	0
COM_F31	344.37	768.69	397.28	821.39	324.70	297.96	489.98	399.94	127.99	572.37	184.94	0
COM_F32	287.56	641.47	331.80	685.79	267.65	248.85	492.13	334.18	245.60	173.56	194.68	332.74

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC23	SEC24	SEC25	SEC26	SEC27	SEC28	SEC29	SEC30	SEC31	SEC32	SEC33	SEC34
COM_D41	872.82	297.90	0	156.29	0.00	8437.85	258.00	0.00	0	0.00	0	189.42
COM_D42	394.40	492.13	0	0	0	0	0	165.98	0	133.99	839.15	0
COM_D43	0	1969.46	414.82	657.38	0	0	132.55	0.00	0	0	0	185.37
COM_D44	439.24	3315.60	327.15	986.97	329.34	3482.44	735.27	596.83	617.77	121.33	119.78	536.93
COM_D45	147.76	1782.58	558.60	581.38	111.62	548.29	117.53	2144.73	456.69	132.83	1245.86	149.94
COM_D46	346.84	829.28	599.50	194.17	163.97	139.17	234.20	779.30	454.66	521.74	475.81	462.23
COM_D47	892.85	193.50	139.88	254.44	382.45	324.73	546.46	181.84	168.65	121.58	198.23	947.85
COM_D48	0	337.69	247.74	454.25	0	371.65	590.00	644.90	0	711.42	0	341.97
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	472.56	0	411.17	782.76	144.69	0	418.66
COM_D51	724.77	297.86	133.89	124.40	425.67	641.39	167.31	175.91	331.57	383.95	788.32	199.73
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	134.33	186.25	291.12	626.94	616.57	645.66	325.78	1245.18	712.36	18144.64	146.65	324.97
COM_D54	351.98	475.34	787.47	823.41	959.57	154.99	918.35	427.96	197.18	724.22	373.16	144.33
COM_D55	118.93	1212.61	144.94	958.46	463.40	155.65	495.78	715.94	198.24	388.68	197.16	743.92
COM_D56	591.82	916.26	426.27	511.67	592.25	858.35	278.36	146.14	378.69	1322.80	493.25	812.34
COM_D57	2497.19	11621.86	2714.42	4734.17	1218.27	24774.64	374.00	6381.82	5711.66	7814.37	11174.84	2447.82
COM_D58	511.73	1464.89	567.36	553.73	519.70	1896.75	156.99	216.17	369.55	1873.46	333.64	439.73
COM_F1	1233.75	2392.29	1466.65	2499.30	6467.93	925.24	449.17	23656.19	763.26	416.58	3373.42	0
COM_F2	263.27	345.24	114.85	0	0	0	0	0	0	0	0	0
COM_F3	472.28	419.87	125.95	943.34	234.82	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	228.17	918.00	134.67	254.00	241.94	250.00	0	0	0	197.15	0
COM_F6	0	0	0	134.67	0	0	0	0	0	0	0	0
COM_F7	0	0	0	797.26	789.00	429.48	576.15	756.22	0	0	722.93	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	318.28	0	0	0	0	795.92	416.58	196.56	242.54	167.32	221.38
COM_F12	0	125.56	121.88	236.32	289.12	235.26	181.71	234.84	673.82	831.66	559.13	115.97
COM_F13	0	353.95	291.37	551.93	656.75	566.60	893.69	922.92	327.22	438.65	115.36	239.28
COM_F14	0	0	961.85	0	0	417.57	699.53	124.95	0	0	228.67	458.12
COM_F15	321.85	261.26	183.31	156.89	186.50	291.29	437.81	445.64	176.11	217.36	612.87	124.72
COM_F16	342.73	337.88	295.48	266.66	397.80	571.62	618.29	781.27	397.97	382.36	131.78	274.85
COM_F17	0.00	831.64	721.66	249.26	296.30	895.16	541.58	152.92	554.19	684.48	251.75	522.18
COM_F18	274.25	384.82	249.97	241.58	286.54	271.69	0	315.70	0	0	758.12	157.25
COM_F19	791.74	382.55	191.72	859.98	241.35	0	0	278.19	511.73	0	115.47	199.23
COM_F20	135.72	796.64	335.77	145.88	413.20	0	0	374.80	879.48	0	283.46	359.46
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	812.40	346.76	938.58	249.46	817.00	0	124.29	117.00	0	477.55	0
COM_F23	0	1664.78	0	961.14	288.95	0	0	0	0	0	0.00	0
COM_F24	0	21366.92	189.19	2851.72	3691.69	426.21	0	0	0	0	0.00	0
COM_F25	0	344.56	266.33	398.63	966.18	131.73	0	574.12	132.78	0	119.60	139
COM_F26	299.26	3634.93	431.82	2148.70	191.89	994.97	0	0	0	0	662.38	0
COM_F27	0	0	0	0	248.72	0	0	0	0	0	0	0
COM_F28	0	715.32	972.76	838.45	811.00	922.39	0	0	0	0	0	0
COM_F29	0	215.16	292.98	661.71	438.00	227.28	977.24	0	0	0	0	0
COM_F30	0	754.44	156.86	412.00	461.00	0	232.00	13458.19	5955.54	31729.57	254.53	321.79
COM_F31	822.11	782.38	333.79	473.96	494.00	157.27	353.00	591.73	1639.69	2835.82	148.23	272.16
COM_F32	175.45	581.54	831.14	973.32	633.38	498.33	321.17	232.76	251.19	232.33	488.32	0.00

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Sector	SEC35	SEC36	SEC37	SEC38	SEC39	SEC40	SEC41	SEC42	SEC43	SEC44	SEC45	SEC46
COM_D41	171.11	126.44	959.79	0	261.30	523.12	1333.30	159.87	366.99	176.89	1694.38	761.60
COM_D42	232.95	0	454.19	243.59	0	373.36	158.57	8352.33	227.23	1152.13	4239.88	2479.66
COM_D43	747.14	0	378.30	166.32	458.62	0.00	177.89	743.40	567.14	5785.49	9256.28	8536.28
COM_D44	169.44	176.95	651.12	387.26	527.68	352.89	287.51	993.53	355.13	1813.55	1388.78	2674.28
COM_D45	2177.74	179.87	431.91	421.85	512.45	428.54	711.74	818.56	148.89	349.43	6227.23	849.96
COM_D46	534.45	183.89	127.20	222.19	253.76	244.84	476.47	269.57	217.50	189.42	124.53	28495.94
COM_D47	124.76	427.27	281.66	518.42	593.00	571.28	111.16	628.99	574.95	441.98	295.63	66495.36
COM_D48	212.52	0	212.73	0	0	0	0	698	0	0	196.54	594.21
COM_D49	0	0	0	0	0	0	362.14	0	0	0	0	0
COM_D50	571.53	0	491.88	671.37	0	279.82	433.94	761.50	0.00	462.28	721.84	134.61
COM_D51	472.47	365.94	2792.84	523.75	579.15	546.71	971.75	169.88	447.64	1282.86	776.88	741.85
COM_D52	0	0	0	0	0	0	0	0	0	628.30	0	0
COM_D53	1245.23	997.47	386.17	142.67	378.45	396.20	252.67	183.79	998.21	186.26	198.38	938.30
COM_D54	476.91	599.19	322.27	141.34	141.62	395.32	351.49	213.65	162.62	115.57	972.14	356.99
COM_D55	612.55	181.43	138.38	235.67	812.75	298.87	593.86	256.28	436.90	114.39	228.24	788.12
COM_D56	738.86	124.86	417.89	744.67	726.95	742.19	812.46	292.82	482.58	678.63	729.97	1387.17
COM_D57	11697.87	1813.54	6796.62	3998.19	3691.76	5314.81	4717.13	2245.75	161.39	4642.34	2334.72	4388.42
COM_D58	2485.69	125.23	947.46	393.29	835.90	591.42	394.82	186.15	239.77	662.59	464.92	1759.80
COM_F1	945.00	485.42	1158.56	579.29	326.00	284.00	118.12	126.96	137.48	392.39	719	0
COM_F2	0	0	541.61	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	118.85	0	0	0	0	0	0	0	0	0
COM_F5	111.88	968.00	493.31	0	0	0	156.52	0	0	0	0	0
COM_F6	0	0	229.23	0	0	0	0	0	0	0	0	0
COM_F7	597.23	0	387.32	0	0	3392.59	924.95	425.29	337.36	0	0	0
COM_F8	0	187.39	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	142.91	0	0	473.12	586.56	0	225.69	0	0	0
COM_F12	0	0	867.43	256.84	215.53	779.66	142.18	397.24	371.78	772.54	139.96	118.62
COM_F13	0	0	211.69	653.54	482.93	372.95	985.96	954.87	177.85	184.84	335.27	281.17
COM_F14	0	0	224.92	816.62	0	774.17	879.84	239.60	369.17	335.47	719.80	531.76
COM_F15	152.60	466.84	143.34	411.62	324.85	171.44	234.94	657.55	811.34	138.76	223.63	154.42
COM_F16	235.29	718.94	259.58	715.32	576.68	262.25	461.72	111.94	125.53	242.81	393.60	347.31
COM_F17	464.58	142.17	417.24	126.43	121.94	676.98	734.57	281.26	322.40	394.72	712.43	0
COM_F18	1278.80	314.46	129.65	167.59	264.12	469.58	197.16	888.74	223.92	458.74	234.17	482.63
COM_F19	2355.66	125.15	372.20	432.88	132.84	215.32	817.43	112.57	897.74	556.25	791.94	513.19
COM_F20	415.13	225.58	669.67	781.13	238.34	388.53	147.54	192.97	152.73	953.56	135.77	879.74
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	161.63	632.20	1237.45	125.42	929.96	2288.58	2349.52	716.28	8915.12	152.63	825.78	165.25
COM_F23	0	0	887	0	0	0	0	0	0	0	0	0
COM_F24	476.89	0	1989.83	0	396.48	0	0	0	471	0	0	0
COM_F25	169.96	110	231.78	191.66	0	0	939	0	0	0	0	451.63
COM_F26	0	0	151.14	0	0	0	0	0	0	0	0	0
COM_F27	0	0	549.99	0	0	0	0	0	0	0	0	0
COM_F28	0	0	194.11	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	1272.34	215.24	361.29	446.34	515.38	273.27	584.95	0	0	663.56	0	277.67
COM_F31	1519.43	922.99	517.31	199.25	242.59	273.47	289.36	297.98	0	133.44	216.40	944.11
COM_F32	158.72	188.82	286.24	117.44	226.14	228.25	111.92	252.45	0	362.17	187.45	334.68

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Sector	SEC47	SEC48	SEC49	SEC50	SEC51	SEC52	SEC53	SEC54	SEC55	SEC56	SEC57	SEC58
COM_D41	1777.62	512.63	565.38	0	299.16	167.14	2937.99	786.60	51277.87	3417.49	877.12	2132.51
COM_D42	5785.87	3742.56	1267.84	592.71	368.88	246.29	534.53	671.24	5493.69	1449.55	237.88	328.17
COM_D43	19917.99	159.74	621.19	0	337.75	6787.14	515.54	421.32	1777.28	396.24	595.99	274.76
COM_D44	6239.98	481.90	442.57	383.84	987.88	213.65	389.35	792.89	9627.12	8725.35	1239.57	3613.47
COM_D45	1962.32	11963.72	2257.66	254.67	584.55	964.86	595.53	766.32	1725.42	6215.85	2999.43	1319.42
COM_D46	66495.36	515.62	154.66	224.49	122.25	133.83	795.63	877.17	2147.65	5138.52	2798.65	3376.44
COM_D47	155144.6	1231.74	367.48	513.44	285.25	241.23	1856.48	811.79	5111.83	11698.99	6323.19	7878.36
COM_D48	138.65	31277.64	1912.97	0	0	0	149.14	172.34	834.11	2762.44	244.99	0
COM_D49	0	0	6563.78	0	0	0	0	0	576.86	0	484.93	0
COM_D50	314.99	116.37	119.20	22937.80	577.60	434.61	897.80	557.73	196.36	18278.51	930	3467.22
COM_D51	1739.89	251.49	1874.76	491.82	16858.73	265.51	3619.66	0	7959.49	9173.76	1831.90	288.37
COM_D52	0	0	0	0	0	12162.76	262.89	0	0	214.82	341.43	1259.25
COM_D53	217.19	968.85	213.42	1162.16	468.74	595.44	14363.23	3296.67	381.23	6482.35	12295.89	3556.83
COM_D54	636.54	977.64	456.19	145.84	111.43	743.66	233.67	0	433.17	986.43	2914.83	539.14
COM_D55	1838.94	115.55	155.56	136.92	896.55	352.16	297.16	334.72	292.92	5134.84	12335.24	268.71
COM_D56	2423.67	526.56	417.32	113.17	695.36	583.21	397.46	264.75	6793	22479.81	22794.73	1453.40
COM_D57	1239.66	4567.71	2839.44	3169	3693.32	2293.13	7176.15	3139.99	14866.99	289863.3	237213.6	22271.14
COM_D58	4161.77	368.47	178.13	1275.84	634.82	166.25	9483.36	145.66	389.87	5624.39	7874.34	971.68
COM_F1	0	0	813.24	297.73	2725.32	194.17	136.73	0	1178.77	248.70	2824.30	1442.44
COM_F2	0	0	0	0	0	0	0	0	0	0	486.41	0
COM_F3	0	0	0	0	0	0	0	0	0	0	932.32	0
COM_F4	0	0	0	0	0	0	0	0	0	0	133	0
COM_F5	0	0	0	0	0	0	0	0	0	0	123.39	443.14
COM_F6	0	0	0	0	0	0	0	0	0	0	245.95	395.31
COM_F7	0	152.43	0	0	0	0	161.85	0	0	0	274.42	163.67
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	589.48	0	0	0	0	0	0	0	0	0
COM_F11	248.98	0	139.95	0	121.52	651.25	188.80	0	415.44	452.96	463.69	474.90
COM_F12	426.67	265.84	275.65	227.49	177.57	124.95	362.23	0	658.75	829.48	512.76	121.64
COM_F13	339.43	633.12	771.55	539.44	825.83	643.56	186.57	0	294.81	447.87	264.83	578.46
COM_F14	176.96	361.99	169.24	126.33	457.36	934.61	279.49	0	576.76	0.00	166.27	0
COM_F15	426.26	132.71	0	313.99	374.77	349.86	114.25	465.99	497.29	2135.16	2167.18	116.18
COM_F16	788.60	175.80	463.75	459.33	438.32	155.69	365.68	748.20	858.43	285.65	299.68	119.35
COM_F17	118.30	222.64	0	935.64	153.39	167.81	486.49	0	622.25	0	0	0
COM_F18	148.16	174.68	0	231.19	0	834.12	241.81	0	1648.19	167.84	567.72	556.65
COM_F19	121.13	122.45	396.36	654.90	799.49	157.47	449.97	0	122.93	376.12	1634.82	164.45
COM_F20	276.44	292.18	669.66	137.98	137.41	269.95	771.26	0	217.44	644.78	296.73	284.46
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	374.56	898.27	139.85	327.30	260	999.33	838.63	118.30	1567.81	0	159.18	784.92
COM_F23	0	0	0	189.66	0	0	211.28	0	0	0	1478.63	842.74
COM_F24	0	0	0	973.00	0	0	0	0	0	0	15948.48	751.78
COM_F25	153.80	0.00	459.69	728.27	324.33	0	0	0	0	0	692.14	133.86
COM_F26	0	0	0	0	0	0	215.49	0	0	182.65	2425.94	157.60
COM_F27	0	0	0	0	0	0	0	0	0	0	158.48	779.89
COM_F28	0	0	0	0	0	0	0	0	0	0	238.34	5373.34	1622.27
COM_F29	0	0	0	0	0	0	0	0	0	0	178.83	377.96	943.91
COM_F30	647.89	367.69	129.31	1461.50	397.28	249.62	1246.87	0	494.45	365.69	158.71	311.39
COM_F31	222.93	139.45	127.88	739.27	582.94	188.95	2799.41	373.94	122.13	3712.47	1248.73	1291.68
COM_F32	788.99	265.39	371.87	137.42	141.73	0	274.19	713.82	839.65	1156.38	372.68	636.92

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Sector	COM_D1	COM_D2	COM_D3	COM_D4	COM_D5	COM_D6	COM_D7	COM_D8	COM_D9	COM_D10	COM_D11	COM_D12
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D13	COM_D14	COM_D15	COM_D16	COM_D17	COM_D18	COM_D19	COM_D20	COM_D21	COM_D22	COM_D23	COM_D24
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D25	COM_D26	COM_D27	COM_D28	COM_D29	COM_D30	COM_D31	COM_D32	COM_D33	COM_D34	COM_D35	COM_D36
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D37	COM_D38	COM_D39	COM_D40	COM_D41	COM_D42	COM_D43	COM_D44	COM_D45	COM_D46	COM_D47	COM_D48
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_D49	COM_D50	COM_D51	COM_D52	COM_D53	COM_D54	COM_D55	COM_D56	COM_D57	COM_D58	COM_F1	COM_F2
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F3	COM_F4	COM_F5	COM_F6	COM_F7	COM_F8	COM_F9	COM_F10	COM_F11	COM_F12	COM_F13	COM_F14
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F15	COM_F16	COM_F17	COM_F18	COM_F19	COM_F20	COM_F21	COM_F22	COM_F23	COM_F24	COM_F25	COM_F26
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F27	COM_F28	COM_F29	COM_F30	COM_F31	COM_F32	COM_F33	COM_F34	COM_F35	COM_F36	COM_F37	COM_F38
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F39	COM_F40	COM_F41	COM_F42	COM_F43	COM_F44	COM_F45	COM_F46	COM_F47	COM_F48	COM_F49	COM_F50
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	0	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F51	COM_F52	COM_F53	COM_F54	COM_F55	COM_F56	COM_F57	COM_F58	TTM1	DIRTAX1	VAT1	EXCSTAX1
COM_D41	0	0	0	0	0	0	0	0	0	0	0	0
COM_D42	0	0	0	0	0	0	0	0	0	0	0	0
COM_D43	0	0	0	0	0	0	0	0	0	0	0	0
COM_D44	0	0	0	0	0	0	0	0	0	0	0	0
COM_D45	0	0	0	0	0	0	0	0	0	0	0	0
COM_D46	0	0	0	0	0	0	0	0	0	0	0	0
COM_D47	0	0	0	0	0	0	0	0	0	0	0	0
COM_D48	0	0	0	0	0	0	0	0	0	0	0	0
COM_D49	0	0	0	0	0	0	0	0	0	0	0	0
COM_D50	0	0	0	0	0	0	0	0	0	0	0	0
COM_D51	0	0	0	0	0	0	0	0	0	0	0	0
COM_D52	0	0	0	0	0	0	0	0	0	0	0	0
COM_D53	0	0	0	0	0	0	0	0	0	0	0	0
COM_D54	0	0	0	0	0	0	0	0	0	0	0	0
COM_D55	0	0	0	0	0	0	0	0	0	0	0	0
COM_D56	0	0	0	0	0	0	0	0	188665.7	0	0	0
COM_D57	0	0	0	0	0	0	0	0	0	0	0	0
COM_D58	0	0	0	0	0	0	0	0	0	0	0	0
COM_F1	0	0	0	0	0	0	0	0	0	0	0	0
COM_F2	0	0	0	0	0	0	0	0	0	0	0	0
COM_F3	0	0	0	0	0	0	0	0	0	0	0	0
COM_F4	0	0	0	0	0	0	0	0	0	0	0	0
COM_F5	0	0	0	0	0	0	0	0	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	0	0	0	0	0	0	0	0	0
COM_F12	0	0	0	0	0	0	0	0	0	0	0	0
COM_F13	0	0	0	0	0	0	0	0	0	0	0	0
COM_F14	0	0	0	0	0	0	0	0	0	0	0	0
COM_F15	0	0	0	0	0	0	0	0	0	0	0	0
COM_F16	0	0	0	0	0	0	0	0	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	0	0	0	0	0	0	0	0	0
COM_F19	0	0	0	0	0	0	0	0	0	0	0	0
COM_F20	0	0	0	0	0	0	0	0	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	0
COM_F22	0	0	0	0	0	0	0	0	0	0	0	0
COM_F23	0	0	0	0	0	0	0	0	0	0	0	0
COM_F24	0	0	0	0	0	0	0	0	0	0	0	0
COM_F25	0	0	0	0	0	0	0	0	0	0	0	0
COM_F26	0	0	0	0	0	0	0	0	0	0	0	0
COM_F27	0	0	0	0	0	0	0	0	0	0	0	0
COM_F28	0	0	0	0	0	0	0	0	0	0	0	0
COM_F29	0	0	0	0	0	0	0	0	0	0	0	0
COM_F30	0	0	0	0	0	0	0	0	0	0	0	0
COM_F31	0	0	0	0	0	0	0	0	0	0	0	0
COM_F32	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	TARIFF1	OINDTAX1	SUBY1	HHH1	HHH2	HHH3	HHH4	HHH5	GOV1	POE1	ROW1	KA
COM_D41	0	0	0	364.89	511.41	667.37	1636.93	2536.67	148.68	0	4162.86	3738.30
COM_D42	0	0	0	0	0	0	0	0	264.61	0	57128.70	63587.47
COM_D43	0	0	0	0	0	0	0	0	0	0	39715.37	0
COM_D44	0	0	0	1371.46	1484.32	1697.58	2776.37	5249.85	2995.79	0	77737	18658.39
COM_D45	0	0	0	449.42	499.19	146.61	233.79	593.63	1712.62	0	12229.40	129864.1
COM_D46	0	0	0	1417.18	2634.53	3967.96	6327.55	14225.32	1244.69	0	374898.5	0
COM_D47	0	0	0	3367.57	6147.23	9258.45	14764.17	33139.24	2394.29	0	872876.3	0
COM_D48	0	0	0	3238.12	6168.87	1596.95	16898.64	71679.37	158.54	0	23121.28	14117.49
COM_D49	0	0	0	156.69	345.23	744.54	118.73	282.34	136.55	0	13671.64	5291.37
COM_D50	0	0	0	8195.89	12986.27	18476.44	29463.85	53284.10	121.97	0	44736.84	756.31
COM_D51	0	0	0	3927.65	4617.58	6184.43	9862.13	12587.22	111.47	0	62846.19	8528.73
COM_D52	0	0	0	5417.82	1899.75	17358.19	28219.89	79231.85	0	0	119362.6	8991.26
COM_D53	0	0	0	2137.28	4418.13	6892.53	1991.31	29945.13	11613.69	0	16721.55	26272.40
COM_D54	0	0	0	1475.20	2172.25	3391.30	4392.84	6427.23	1765.56	0	976.93	325.28
COM_D55	0	0	0	887.72	124.32	162.16	258.59	616.68	1859.79	0	0	566649.6
COM_D56	0	0	0	12528.28	2425.46	27392.62	43682.18	11923.69	6415.17	0	438.66	0
COM_D57	0	0	0	41262.77	76491.17	133519.6	212919.8	52389.62	725736.8	0	5974.23	0
COM_D58	0	0	0	4188.19	1949.54	11927.43	18989.44	139548.9	1226.69	0	16422.32	157.97
COM_F1	0	0	0	2881.53	3821.31	4551.19	7259.60	9111.66	0	0	0	179.33
COM_F2	0	0	0	115.34	648.62	143.46	237.27	0	0	0	0	647.60
COM_F3	0	0	0	459.73	279.44	148.43	221.25	466.68	0	0	0	323.80
COM_F4	0	0	0	494.26	377.85	294.76	436.36	716.55	0	0	0	179.33
COM_F5	0	0	0	414.66	613.84	716.76	114.30	186.83	0	0	0	0
COM_F6	0	0	0	0	0	0	0	0	0	0	0	0
COM_F7	0	0	0	0	0	0	0	0	0	0	0	0
COM_F8	0	0	0	0	0	0	0	0	0	0	0	0
COM_F9	0	0	0	0	0	0	0	0	0	0	0	0
COM_F10	0	0	0	0	0	0	0	0	0	0	0	0
COM_F11	0	0	0	499.22	767.30	194.47	154.54	597.42	0	0	0	0
COM_F12	0	0	0	281.84	421.70	477.30	493.20	886.66	0	0	0	0
COM_F13	0	0	0	477.12	691.39	978.57	184.98	833.75	0	0	0	0
COM_F14	0	0	0	251.35	133.53	782.92	477.17	233.95	0	0	0	0
COM_F15	0	0	0	288.84	641.65	1139.15	2252.45	5285.49	0	0	0	0
COM_F16	0	0	0	211.54	470	834.31	164.97	387.17	0	0	0	0
COM_F17	0	0	0	0	0	0	0	0	0	0	0	0
COM_F18	0	0	0	317.36	475.64	653.61	726.59	1793.92	0	0	0	0
COM_F19	0	0	0	589.16	872.99	1289.98	1953.96	3794.69	0	0	0	0
COM_F20	0	0	0	351.53	452.17	626.20	1124.95	1965.45	0	0	0	0
COM_F21	0	0	0	0	0	0	0	0	0	0	0	187362.9
COM_F22	0	0	0	146.48	199.52	249.79	398.33	453.35	0	0	0	376.57
COM_F23	0	0	0	284.93	388.93	485.88	774.82	881.75	0	0	0	0
COM_F24	0	0	0	6919.12	9424.35	11798.88	18815.31	21412.24	0	0	0	0
COM_F25	0	0	0	137.42	187.63	231.42	369.45	343.17	0	0	0	0
COM_F26	0	0	0	923.66	1337.25	1662.75	2651.47	2775.32	0	0	0	0
COM_F27	0	0	0	467.72	554.53	693.66	116.14	125.88	0	0	0	0
COM_F28	0	0	0	884.78	1751.26	2822.67	4512.29	7429.35	0	0	0	0
COM_F29	0	0	0	495.53	776.17	1269.31	2241.16	1889.38	0	0	0	0
COM_F30	0	0	0	495.37	839.20	123.71	197.28	381.42	0	0	0	0
COM_F31	0	0	0	943.33	1598.77	2355.84	3756.78	7238.28	0	0	0	174.29
COM_F32	0	0	0	715.14	1311.34	2231.46	3226.25	6555.28	0	0	0	338.59

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	FACT1	FACT2	SEC1	SEC2	SEC3	SEC4	SEC5	SEC6	SEC7	SEC8	SEC9	SEC10
COM_F33	0	0	374.33	0	0	0	972.15	194.25	695.23	286.42	369.79	194.11
COM_F34	0	0	177.34	0	0	0	838.99	167.67	191.88	797.59	942.25	494.67
COM_F35	0	0	3765.98	0	0	0	925.39	225.50	154.83	632.78	732.63	383.42
COM_F36	0	0	42878.70	0	0	0	0	0	0	0	0	0
COM_F37	0	0	324.99	136.29	974.87	166.22	622.98	435.68	137.55	724.65	1859.54	572.16
COM_F38	0	0	633.85	143.45	0	0	0	0	0	296.18	0	0
COM_F39	0	0	2361.86	132.35	576.37	146.65	374.62	657.95	0	499.95	1995.59	577.33
COM_F40	0	0	299.83	0	0	0	356.44	219.99	0	0	0	0
COM_F41	0	0	467.34	0	0	0	389.68	0	157.00	0	0	0
COM_F42	0	0	429.88	221.68	0	0	0	0	135	0	0	0
COM_F43	0	0	226.88	0	0	0	0	0	0	0	0	0
COM_F44	0	0	4296.74	193.74	219.26	194.17	146.85	128.40	322.82	0.00	0.00	0.00
COM_F45	0	0	3825.63	245.69	719.11	475.29	821.47	122.25	252.55	1287.38	438.64	233.22
COM_F46	0	0	718.98	0	0	0	124.52	675.83	318.89	384.49	112.84	579.69
COM_F47	0	0	167.76	0	0	0	288.35	179.78	744.70	897.13	336.81	173.64
COM_F48	0	0	233.95	296.99	212.85	269.82	0	0	0	0	0	0
COM_F49	0	0	1285.23	0	0	0	0	0	0	119.67	0	0
COM_F50	0	0	216.00	0	0	0	0	0	0	0	0	0
COM_F51	0	0	796.66	0	0	0	611.60	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	167.20	169.26	196.30	0.00	265.37	139.38	499.36	184.43	132.47	693.35
COM_F54	0	0	0	0	0	0	257.58	129.85	0.00	0.00	122.49	643.23
COM_F55	0	0	313.15	222.82	544.98	217.38	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	761.43	188.40	0.00	375.34	542.71	569.64	282.27	731.44	451.91	237.29
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	637.54	152.52	281.52	367.44	1423.63	343.50	1444.92	15293.56	477.53	245.97
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	273691.8	0	0	0	0	0	0	0	0	0	0	0
HHH2	43364.44	0	0	0	0	0	0	0	0	0	0	0
HHH3	421641.8	0	0	0	0	0	0	0	0	0	0	0
HHH4	553816.3	0	0	0	0	0	0	0	0	0	0	0
HHH5	813927.5	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	426613.5	0	0	0	0	0	0	0	0	0	0
ROW1	7637	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC11	SEC12	SEC13	SEC14	SEC15	SEC16	SEC17	SEC18	SEC19	SEC20	SEC21	SEC22
COM_F33	676.78	133.83	587.39	142.39	556.57	596.38	858.80	732.36	511.31	228.64	715.53	112.35
COM_F34	154.84	339.97	149.67	361.90	141.81	129.86	218.82	179.13	268.93	122.46	863.45	439.61
COM_F35	9366.65	1278.56	0	0	0	0	0	18565.59	2924.84	1379.44	422.33	325.52
COM_F36	0	0	0	0	0	0	0	0	484.46	216.65	0	0
COM_F37	147.75	323.22	216.27	344.94	135.24	123.67	284.53	272.13	113.62	453.27	992.45	113.73
COM_F38	0	0	0	0	0	0	0	0	0	0	4496.19	129.33
COM_F39	387.34	848.50	381.48	952.78	355.21	324.25	547.28	595.37	526.62	232.83	332.71	157.85
COM_F40	0	0	0	0	0	0	0	0	0	0	380.00	181.00
COM_F41	181.74	363.49	0.00	363.49	272.62	181.74	181.74	221.46	478.54	213.99	117.22	471.43
COM_F42	0	0	0	0	0	0	0	0	0	0	592.53	117.25
COM_F43	127.43	254.87	0.00	254.87	191.15	127.43	127.43	155.28	0	0	0	0
COM_F44	464.44	117.25	448.36	185.56	425.45	389.57	656.45	195.26	1325.48	595.20	4385.84	596.67
COM_F45	899.49	195.13	863.84	282.50	816.16	747.23	125.92	386.48	5477.31	2449.33	3928.95	646.50
COM_F46	193.49	239.38	157.32	255.43	113.20	918.20	154.52	659.34	1234.53	457.64	918.75	995.39
COM_F47	192.86	239.88	165.24	255.66	132.97	915.32	155.45	667.77	1354.14	2388.67	2143.75	232.18
COM_F48	0	0	0	0	0	0	0	0	183.86	484.68	1851.56	0
COM_F49	0	0	0	0	0	0	0	0	0	0	11771.66	978.67
COM_F50	0	0	0	0	0	0	0	0	0	0	365.35	0
COM_F51	115.75	253.32	113.85	271.34	162.60	967.72	163.18	183.95	0	877	177.33	231.24
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	243.15	532.39	235.29	568.20	222.67	238.60	343.50	375.80	1248.78	558.42	543.83	898.40
COM_F54	416.72	912.86	422.32	974.22	381.78	349.57	589.32	979.34	0	0	358.92	584.93
COM_F55	0	0	0	0	0	0	0	0	923.79	435.19	0	217
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	251.46	555.22	242.27	587.58	232.38	217.96	355.22	981.24	1757.48	782.89	2868.61	136.23
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	949.94	2938.69	522.38	1527.67	6526.88	149.56	923.42	1842.38	15432.30	2144.48	9773.48	655.52
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC23	SEC24	SEC25	SEC26	SEC27	SEC28	SEC29	SEC30	SEC31	SEC32	SEC33	SEC34
COM_F33	942.51	895.66	258.00	352.86	577.67	361.24	1654.65	151.93	344.82	189.31	17981.46	5497.69
COM_F34	248.21	163.82	194.64	187.59	252.98	259.30	965.80	111.26	238.87	448.27	535.73	114.89
COM_F35	868.13	3916.50	575.78	1236.68	254.78	3426.64	785.29	17878.67	1768.49	1536.38	7884.68	558.22
COM_F36	0	0	0	816.98	0	961.51	0	0	0	0	0	0
COM_F37	528.23	813.54	329.48	1975.00	152.12	863.90	125.42	1154.93	1538.35	1285.77	2721.65	7789.22
COM_F38	0	867.86	136.24	777.97	0	389.16	543	149.77	212.27	633.93	516.32	179.42
COM_F39	398.85	2172.19	524.86	2145.17	118.79	724.22	773.99	498.95	1242.28	1883.38	236.41	123.89
COM_F40	0	240	0	0	0	285	0	0	0	0	622.00	0
COM_F41	715.93	244.37	0	127.93	0	6921.15	212	0	0	0	0	131.69
COM_F42	277.18	345.87	0	0	0	0	0	116.65	0.00	935.41	589.75	0.00
COM_F43	0	4526.29	171.30	251.34	0	0	545.13	0	0	0	0	765.43
COM_F44	579.15	1267.88	427.43	232.14	853.14	1895.30	954.23	1339.82	176.97	362.65	222.94	832.33
COM_F45	238.13	2458.89	736.17	814.83	153.97	746.78	162.12	2958.44	629.96	183.22	1788.79	144.83
COM_F46	327.25	873.62	612.87	122.73	156.36	274.75	221.15	886.99	535.64	571.70	448.91	382.67
COM_F47	763.58	188.38	143.38	286.38	364.84	641.86	513.61	269.63	124.98	118.34	147.47	891.49
COM_F48	0	131.44	168.93	174.93	0.00	621.32	220	276.33	0	369.66	0	147.55
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	525.33	0	457.82	955.21	964.35	0	342.87
COM_F51	355.58	191.81	515.58	123.87	911.70	249.29	651	477.47	156.97	146.34	118.48	141.12
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	127.33	665.69	182.43	291.23	819.92	226.78	455.95	457.31	261.12	5313.78	446.97	937.35
COM_F54	857.77	223.49	147	937.40	263.62	0	0	353.59	757.92	0	142.39	245.67
COM_F55	290	0	277	0	0	0	0	952	252	165	229	636.00
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	473.63	1355.82	525.12	467.75	472.12	1749.91	144.48	278.73	342.39	1639.79	388.00	463.84
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	676.99	5129.98	826.12	1698.58	337.84	4183.18	3286.82	3255.90	1358.24	2711.84	4423.26	289.75
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC35	SEC36	SEC37	SEC38	SEC39	SEC40	SEC41	SEC42	SEC43	SEC44	SEC45	SEC46
COM_F33	763.70	976.45	2195.42	687.65	937.67	517.91	481.30	812.55	496.56	227.17	881.12	151.35
COM_F34	149.94	771.77	177.66	274.25	216.67	888.24	773.12	171.71	418.00	277.29	424.68	882.99
COM_F35	94441.57	8217.28	22676.98	18218.82	33674.29	744.37	5445.14	154.21	458.92	2316.47	1827.19	7565.54
COM_F36	0	1478.15	0	0	0	0	338	0	0	0	0	0
COM_F37	251.42	123.64	16385.59	486.33	1143.33	759.99	984.67	116.98	381.47	1788.39	267.17	1528.95
COM_F38	299.12	0	235.35	1739.13	158.66	335	296.37	577.13	989.00	351.37	117.16	288.18
COM_F39	698.27	453	2482.84	395.26	244.59	298.86	466.65	156.67	134.59	885.73	245.29	6295.92
COM_F40	0	756.00	0	0	0	186.76	248.97	290.00	169.00	0	438.00	0
COM_F41	123.49	136.83	776.88	0	214.33	475.30	1111.47	513.76	314.18	145.66	1288.58	626.32
COM_F42	163.68	0	457.11	1711.93	0	2637.94	111.94	71262.78	142.47	71348.77	29913.76	17473.63
COM_F43	385.24	0	153.13	443.27	189.38	0.00	734.60	369.78	234.19	23888.76	38222.87	35249.70
COM_F44	371.54	414.57	1945.33	636.48	135.18	383.36	536.94	285.50	154.85	3949.70	2836.18	8111.84
COM_F45	3397.86	234.51	595.78	588.45	764.17	596.89	981.79	138.27	676.54	543.62	9184.80	1213.99
COM_F46	492.35	174.66	225.80	211.95	261.53	233.57	423.00	686.71	274.82	363.96	295.84	24429.16
COM_F47	114.88	475.34	466.73	494.55	691.23	544.98	986.98	162.33	484.13	849.25	692.92	57137.76
COM_F48	917	0	917.89	0	0	0	0	310	0	0	848.45	256.39
COM_F49	0	0	0	0	0	0	270	0	0	0	0	0
COM_F50	391.84	0	334.98	452.49	0	395.71	358.23	758	0	858.62	591.00	112.47
COM_F51	314.59	271.44	115.85	213.83	418.43	229.97	129.74	655.90	157	294.88	463.43	674.74
COM_F52	0	0	0	0	0	0	0	0	0	213.98	0	0
COM_F53	375.28	312.19	319.33	457.70	116.85	117.93	787.76	563.12	364.50	375.24	119	142.65
COM_F54	826.49	449.18	451.32	145.57	358.37	467.97	263.85	990	465.23	191.77	129.23	294.40
COM_F55	695	298	384	127	0	143	482	160	0	130	589	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	2355.15	111.55	877.58	364.13	773.66	547.39	365.43	172.30	221.92	613.26	376.23	1628.78
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	3739.73	519.39	6421.54	1488.35	1455.00	1372.12	1549.90	1137.00	1542.64	2586.40	2358.28	9733.69
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	SEC47	SEC48	SEC49	SEC50	SEC51	SEC52	SEC53	SEC54	SEC55	SEC56	SEC57	SEC58
COM_F33	352.43	265.69	793.74	157.96	132.97	329.68	1658.36	416.94	611.72	6313.19	12946.73	1227.82
COM_F34	254.31	781.44	771.26	117.46	457.85	844.76	268.46	219.27	191.43	4286.76	1519.91	266.24
COM_F35	16465.29	1695.46	351.83	3224.48	517.79	285.47	6213.37	367.62	514.39	395.35	3515.85	3173.40
COM_F36	0	0	0	0	178.12	0	179.54	689.24	754.98	0	1175.77	563.45
COM_F37	3567.53	3249.90	643.79	3774.79	1575.24	113.79	2714.60	127.42	1889.38	13412.73	14476.88	5794.82
COM_F38	672.42	373.39	168.55	871.89	967.37	0.00	1273.33	326.60	1241.49	211.25	138.25	6885.50
COM_F39	14688.55	642.46	336.29	512.32	371.36	471.51	2369.75	578.66	1965.86	13618.86	1117.91	656.95
COM_F40	0	0	0	380	0	0	0	318.64	995.53	153.00	141.49	237.18
COM_F41	1461.41	461.71	782.75	0	257.33	116.27	2414.94	428.11	11262.90	2728.38	633.53	1195.30
COM_F42	4774.88	27915.22	8911.99	416.56	259.25	172.96	3756.62	471.59	38689.47	73438.16	162.97	3714.64
COM_F43	82249.30	659.64	256.52	0	1394.67	28267.57	2128.85	173.98	4132.66	1636.24	246.19	1134.58
COM_F44	18927.65	782.75	825.75	648.39	2951.68	253.67	657.38	248.63	22673.13	24238.34	2119.96	3918.73
COM_F45	2833	14972.77	2812.76	351.30	965.42	162.24	894.11	971.62	2656.74	8443.88	28974.88	2586.84
COM_F46	57137.76	1394.26	433.96	244.74	143.59	164.37	1181.92	128.97	9519.42	11496.94	3629.59	3817.25
COM_F47	133321.3	2455.31	1125.52	571.49	335.53	383.54	2375.38	118.55	22211.99	26826.20	8469.48	8969.28
COM_F48	598.25	129873.3	478.75	0	0	0	643.54	743.66	139.45	765.34	956.12	0
COM_F49	0	0	8516.23	0	0	0	0	0	329.41	0	349.17	0
COM_F50	257.24	535.29	981.57	13745.18	394.26	355.45	154.64	620	897.96	1643.55	799.46	289.92
COM_F51	156.44	156.24	1366.77	364.64	12225.92	125.40	2442.47	0	5679.60	3288.32	446.72	128.24
COM_F52	0	0	0	0	0	36263.53	933.15	0	0	762.52	127.37	446.98
COM_F53	332.84	855.28	373.58	3195.76	121.89	174.14	11725.12	1745.56	275.38	2957.86	1441.98	1654.13
COM_F54	524.93	286.65	898.33	515.2	417.57	822.43	234.97	0	331.54	551.24	451.65	478.33
COM_F55	0	239	287	143	264	0	346	141.13	513	258.77	696.78	342.34
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	3846.50	341.36	164.87	1188.18	587.55	153.87	8776.98	134.81	368.41	5255.70	7288.86	899.35
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	22711.95	7395.67	2289.55	1671.35	1644.43	12288.65	2251.87	325.63	15322.34	79391.79	14868.83	942.55
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D1	COM_D2	COM_D3	COM_D4	COM_D5	COM_D6	COM_D7	COM_D8	COM_D9	COM_D10	COM_D11	COM_D12
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	244245.5	2837.22	8447.66	5975.43	1196.25	4938.99	0	1975.37	12544.77	1328.29	136.15	13363.84
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	3218.26	7277.76	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D13	COM_D14	COM_D15	COM_D16	COM_D17	COM_D18	COM_D19	COM_D20	COM_D21	COM_D22	COM_D23	COM_D24
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	22327.39	0	5881.56	16899.45	131.16	15258.22	3581.43	0	0	31417.89	19138.40	55778.23
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	4899.14	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	6174.73	4953.41	2238.14	14268.27	0	13384.14	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D25	COM_D26	COM_D27	COM_D28	COM_D29	COM_D30	COM_D31	COM_D32	COM_D33	COM_D34	COM_D35	COM_D36
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	4837.73	37532.50	12229.29	47973.18	9876.86	53896.53	17937.92	71564.74	47923.86	19829.19	11516.27	23467.45
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	1361.79	25215.65	0	0	438.80	0	0	536	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D37	COM_D38	COM_D39	COM_D40	COM_D41	COM_D42	COM_D43	COM_D44	COM_D45	COM_D46	COM_D47	COM_D48
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TIM1	185997.7	56317.18	31554.56	2568.73	33127.49	3447.58	45237.75	36985.98	119881.4	17541.37	25929.86	57412.63
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	177.70	0	0	0	451.30	0	0	0	0	251.59	587.48	14564.93
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX1	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_D49	COM_D50	COM_D51	COM_D52	COM_D53	COM_D54	COM_D55	COM_D56	COM_D57	COM_D58	COM_F1	COM_F2
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	4957.37	4356.15	5162.39	72492.34	59332.87	0	399.18	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	300	0	0	0	657.90	0	0	0	743.00	229.16	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	2314.22	0
OINDTAX	0	0	0	0	0	0	0	0	1765.38	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	0	0	0	79832.15	587.44
KA	0	0	0	0	0	0	0	0	0	0	0	0

SOCIAL ACCOUNTING MATRIX OF THAILAND IN 2006
(in millions of Baht)

Sector	COM_F3	COM_F4	COM_F5	COM_F6	COM_F7	COM_F8	COM_F9	COM_F10	COM_F11	COM_F12	COM_F13	COM_F14
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	182.51	-100	33936.41	15936.41	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	988.14	154.92	887.95	128.29	94927.83	478844.0	1264.75	989.23	1865.65	12648.47	4763.99	6833.63
KA	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F15	COM_F16	COM_F17	COM_F18	COM_F19	COM_F20	COM_F21	COM_F22	COM_F23	COM_F24	COM_F25	COM_F26
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	4554.26	0	0	0	5436.32	0	0	1251.30	114.13	5375.25	682.71	2983.85
OINDTAX1	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	34293.19	4553.15	2842.62	15163.93	45462.65	13575.84	187362.9	18952.79	6378.39	19379.56	1531.28	16623.64
KA	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F27	COM_F28	COM_F29	COM_F30	COM_F31	COM_F32	COM_F33	COM_F34	COM_F35	COM_F36	COM_F37	COM_F38
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	518.29	4128.55	1436.44	2935.64	1733.85	1429.99	4559.68	324.79	15699.85	175.74	13765.18	2465.37
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	7874.19	21138.95	6476.48	54126.78	3266.61	15231.43	5856.57	11494.80	293561.4	45976.82	133557.6	22178.27
KA	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F39	COM_F40	COM_F41	COM_F42	COM_F43	COM_F44	COM_F45	COM_F46	COM_F47	COM_F48	COM_F49	COM_F50
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	4146.25	386.29	3258.28	23246.32	11119.37	8513.75	22251.21	6472.49	15124.85	23661.55	2225.53	1478.14
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	0	0	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	84674.22	685.58	34455.27	371637.2	214417.5	158673.5	332743.6	25111.74	583594.7	188897.8	73222.84	25887.93
KA	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	COM_F51	COM_F52	COM_F53	COM_F54	COM_F55	COM_F56	COM_F57	COM_F58	TTM1	DIRTAX1	VAT1	EXCSTAX1
COM_F33	0	0	0	0	0	0	0	0	0	0	0	0
COM_F34	0	0	0	0	0	0	0	0	0	0	0	0
COM_F35	0	0	0	0	0	0	0	0	0	0	0	0
COM_F36	0	0	0	0	0	0	0	0	0	0	0	0
COM_F37	0	0	0	0	0	0	0	0	0	0	0	0
COM_F38	0	0	0	0	0	0	0	0	0	0	0	0
COM_F39	0	0	0	0	0	0	0	0	0	0	0	0
COM_F40	0	0	0	0	0	0	0	0	0	0	0	0
COM_F41	0	0	0	0	0	0	0	0	0	0	0	0
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	0
COM_F44	0	0	0	0	0	0	0	0	0	0	0	0
COM_F45	0	0	0	0	0	0	0	0	0	0	0	0
COM_F46	0	0	0	0	0	0	0	0	0	0	0	0
COM_F47	0	0	0	0	0	0	0	0	0	0	0	0
COM_F48	0	0	0	0	0	0	0	0	0	0	0	0
COM_F49	0	0	0	0	0	0	0	0	0	0	0	0
COM_F50	0	0	0	0	0	0	0	0	0	0	0	0
COM_F51	0	0	0	0	0	0	0	0	0	0	0	0
COM_F52	0	0	0	0	0	0	0	0	0	0	0	0
COM_F53	0	0	0	0	0	0	0	0	0	0	0	0
COM_F54	0	0	0	0	0	0	0	0	0	0	0	0
COM_F55	0	0	0	0	0	0	0	0	0	0	0	0
COM_F56	0	0	0	0	0	0	0	0	0	0	0	0
COM_F57	0	0	0	0	0	0	0	0	0	0	0	0
COM_F58	0	0	0	0	0	0	0	0	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	0	0	0	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	2874.63	1387.18	9459.23	0	163.97	0	417.43	549.48	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	0	0	0	0	0	0	0	0	0
HHH2	0	0	0	0	0	0	0	0	0	0	0	0
HHH3	0	0	0	0	0	0	0	0	0	0	0	0
HHH4	0	0	0	0	0	0	0	0	0	0	0	0
HHH5	0	0	0	0	0	0	0	0	0	0	0	0
GOV1	0	0	0	0	0	0	0	0	0	518121.0	38511.80	57231.55
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	27126.74	86124.96	143944.0	2237.19	273.28	341.14	372763.6	221795.9	0	0	0	0
KA	0	0	0	0	0	0	0	0	0	0	0	0

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Sector	TARIFF1	OINDTAX1	SUBY1	HHH1	HHH2	HHH3	HHH4	HHH5	GOV1	POE1	ROW1	KA
COM_F33	0	0	0	129.24	186.92	283.36	447.35	719.46	0	0	0	0
COM_F34	0	0	0	115.34	268.57	524.45	836.33	2958.22	0	0	0	0
COM_F35	0	0	0	366.50	519.24	665.28	169.80	163.78	0	0	0	0
COM_F36	0	0	0	999.33	267.55	337.68	538.49	342.35	0	0	0	0
COM_F37	0	0	0	4592.13	6397.95	8471.40	13585.12	2411.95	0	0	0	0
COM_F38	0	0	0	296.47	476.69	735.98	1173.65	3343.88	0	0	0	166.16
COM_F39	0	0	0	1782.42	3439.84	4747.63	7578.97	9876.21	0	0	0	846.79
COM_F40	0	0	0	463.85	658.40	847.92	135.21	322.46	0	0	0	0
COM_F41	0	0	0	219.86	381.42	419.16	649.23	1528.46	0	0	0	2169.89
COM_F42	0	0	0	0	0	0	0	0	0	0	0	0
COM_F43	0	0	0	0	0	0	0	0	0	0	0	424.18
COM_F44	0	0	0	2147.47	2883.42	3297.68	5258.77	1198.30	0	0	0	11377.76
COM_F45	0	0	0	681.88	756.51	222.19	354.32	899.65	0	0	0	241235.9
COM_F46	0	0	0	1721.47	3219.42	4819.86	7686.92	17251.99	0	0	0	15937.40
COM_F47	0	0	0	4167.58	7467.12	11246.36	17934.22	4254.64	0	0	0	247187.3
COM_F48	0	0	0	1782.48	2538.86	3528.64	5627.87	23662.25	0	0	0	43465.15
COM_F49	0	0	0	956.40	294.53	451.79	723.27	126.33	0	0	0	54391.32
COM_F50	0	0	0	726.68	1152.22	1639.35	2614.22	4727.39	0	0	0	259.12
COM_F51	0	0	0	135.97	237.64	271.89	433.58	553.39	0	0	0	1238.37
COM_F52	0	0	0	1922.84	3868.94	6161.44	1168.88	28124.13	0	0	0	632.11
COM_F53	0	0	0	1125.11	2317.25	3628.38	5786.70	15763.72	0	0	0	82534.61
COM_F54	0	0	0	166.85	245.86	344.75	527.80	762.52	0	0	0	0
COM_F55	0	0	0	116.74	163.69	213.40	342.99	811.54	0	0	0.0	286.21
COM_F56	0	0	0	275.27	338.25	453.75	723.58	168.83	0	0	0	0
COM_F57	0	0	0	673.80	1241.12	2183.99	3476.86	8497.66	0	0	0	356678.4
COM_F58	0	0	0	3876.36	1134.32	11165.63	17567.78	129159.3	0	0	0	0
TTM1	0	0	0	0	0	0	0	0	0	0	0	0
DIRTAX1	0	0	0	0	0	0	0	148815.0	0	369360	0	0
VAT1	0	0	0	0	0	0	0	0	0	0	0	0
EXCSTAX	0	0	0	0	0	0	0	0	0	0	0	0
TARIFF1	0	0	0	0	0	0	0	0	0	0	0	0
OINDTAX	0	0	0	0	0	0	0	0	0	0	0	0
SUBY1	0	0	0	0	0	0	0	0	0	0	0	0
HHH1	0	0	0	473.77	0	0	0	0	9636.28	4359.87	16619.74	0
HHH2	0	0	0	0	2344.37	0	0	0	17335.89	26657.54	2924.40	0
HHH3	0	0	0	0	0	6334.13	0	0	15333.25	253794.8	24976.13	0
HHH4	0	0	0	0	0	0	1977.28	0	17872.73	62835.33	24588.73	0
HHH5	0	0	0	0	0	0	0	35866.94	29578.89	1448457	376833.2	0
GOV1	257312.5	61522.79	0	0	0	-979	962	7264.45	0	3577.75	6326	0
POE1	0	0	0	0	0	0	0	0	0	0	0	0
ROW1	0	0	0	0	0	0	0	12597	1382	136377	0	0
KA	0	0	0	0	0	3332.39	62379.40	92839.45	386885.6	1334253	118756.5	0